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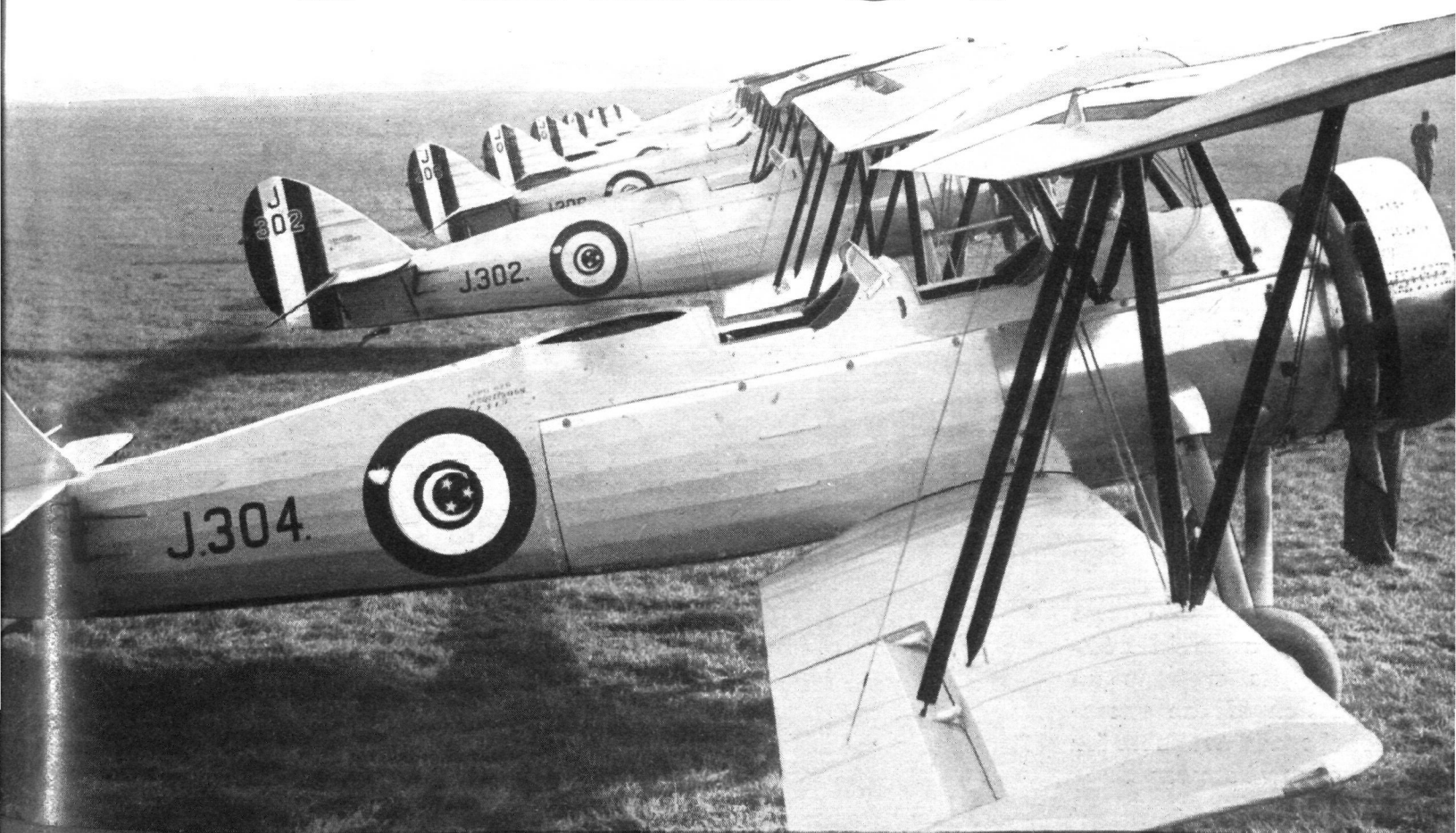
The
AIRCRAFT ENGINEER
AND AIRSHIPS

No. 1303
Vol. XXV
No. 50

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

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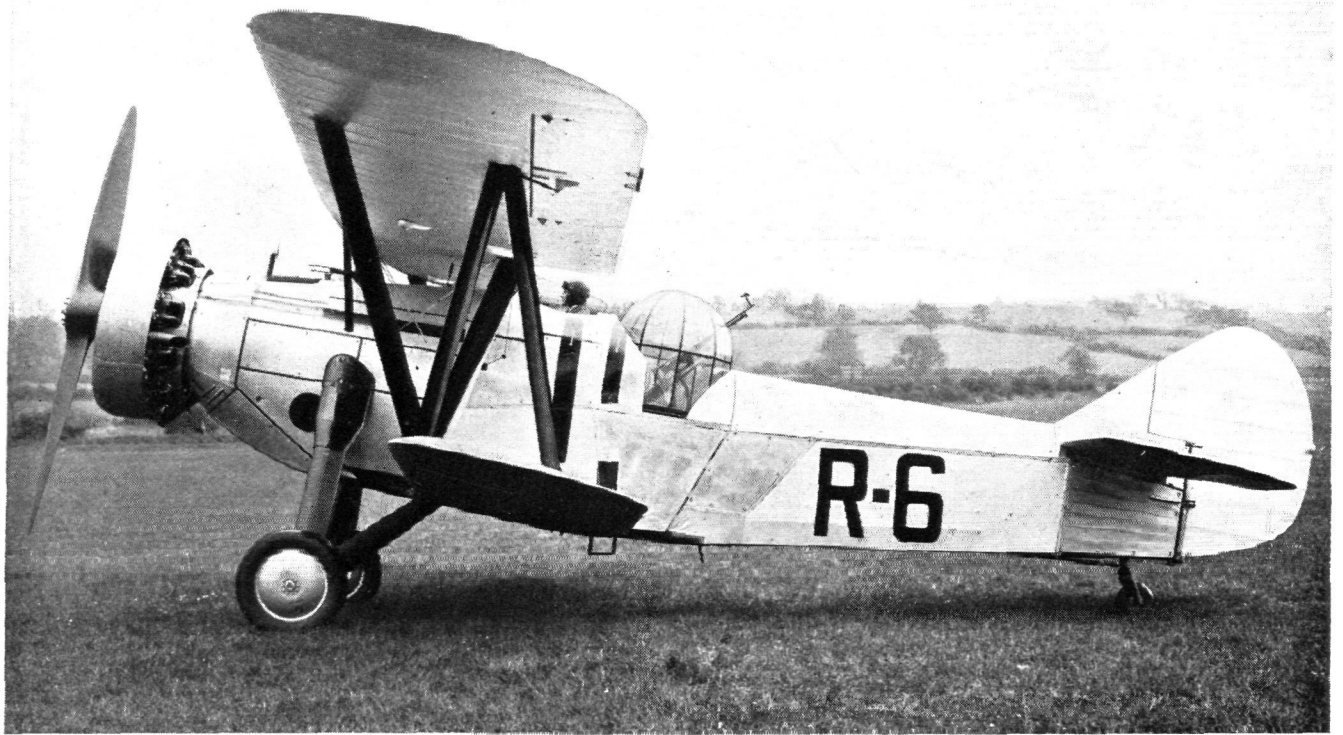
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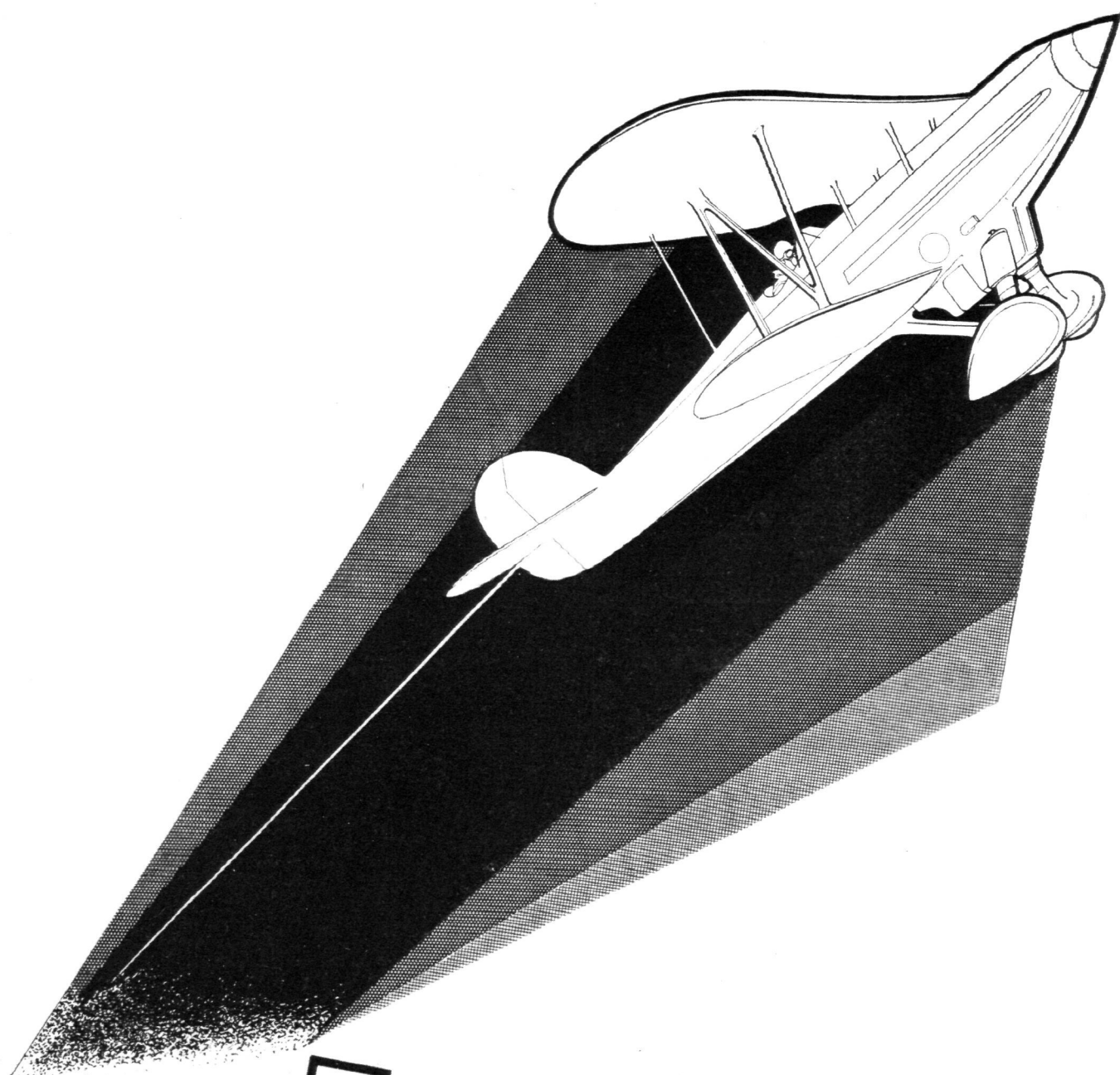
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Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice and Progress of Aerial Locomotion and Transport
OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

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DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list :—

1933.		
Dec.	14.	"Light Alloys for Aeronautical Purposes." Lecture by Dr. L. Aitchison before R.Ae.S.
Dec.	15.	Close of entries for International Touring Competition (1934), Poland.
Dec.	16.	Reading Ae.C. Dance.
Dec.	18-24.	International Rally at Cairo and Meeting of the F.A.I.
Dec.	28.	Irish Ae.C. Annual Dance, Gresham Hotel, Dublin.
Dec.	29.	Liverpool and Dis. Ae.C. Annual Ball, Grosvenor Hotel, Chester.
1934		
Jan.	11	"Testing of Aircraft Landing Mechanisms and Some Factors Affecting Design." Lecture by W. D. Douglas, before R.Ae.S.
Jan.	18.	"Ethyl," Lecture by F. R. Banks before R.Ae.S.
Jan.	19.	Newcastle-on-Tyne Ae.C. Annual Ball, Barras Bridge Assembly Rooms.
Jan.	24.	"Development of the Fleet Air Arm." Lecture by Wing Com. W. R. D. Acland before R.U.S.I.
Feb.	1.	"Engine Cowlings," lecture by J. D. North before R.Ae.S.
Feb.	8.	"Engines," Lecture by Capt. A. G. Forsyth before R.Ae.S.
Feb.	16.	Bristol and Wessex Ae.C. Annual Ball, Grand Spa Hotel, Clifton.
Feb.	21.	"Development of Aircraft and Its Influence on Air Operations." Lecture by Sq. Ldr. R. V. Goddard before R.U.S.I.
Feb.	22.	Herts and Essex Ae.C. Annual Dinner and Dance, Wharnclyffe Rooms, Hotel Gt. Central, London.
Mar.	15.	"Some Developments in Aircraft Construction." Lecture by H. J. Pollard before R.Ae.S.
Mar.	21.	"Some Problems of a Technical Service." Lecture by Wing Com. G. W. Williamson before R.U.S.I.
Mar.	29.	"Results from the Compressed-Air Tunnel." Lecture by E. F. Relf before R.Ae.S.

EDITORIAL COMMENT



It would have been very amusing if one could have seen the faces of Lord Londonderry and Mr. Baldwin respectively on the morning of November 30 when each opened his newspaper at breakfast time and read what the other had said the day before in "Another Place." Or, possibly, did they ring each other up as soon as the two Houses of Parliament had finished their day's sitting, and each indignantly ask the other "What have you been saying to-day?"

In Another Place

There certainly seems to have been a lack of good team work in the Cabinet on the occasion of the two debates on the air strength of Great Britain. The good Conservative voter may well wonder why. It was known beforehand that the Duke of Sutherland was going to raise the question in the House of Lords, while Rear-Admiral Murray Sueter did the same in the House of Commons. There was considerable excitement about the matter. The Secretary-General of the Air League had burst into print with one of his well-reasoned articles. FLIGHT and the lesser organs of the Press had cried loudly that Air Defence of Great Britain must have the missing 10 squadrons, and then some. It was known that spokesmen of the Government would make important replies, statements of policy it was hoped. The stage was set for a great occasion which might have its repercussions on the prospects of peace in Europe.

And then what happened? Well, the House of Lords rose to the great occasion in a manner worthy of its best traditions. The Marquess of Londonderry, Secretary of State for Air, made one of his excellent speeches in his best vein. He was peaceful and conciliatory, and at the same time very explicit and firm. He was still hopeful, though rather faintly hopeful, of a measure of disarmament by agreement, war he described as a folly, a race in armaments must be avoided at all costs, and so forth. No one could call his speech bellicose. It was full of all proper sentiments. At the same time he made it quite clear that we can no longer persist in our policy of what is called unilateral disarmament. That, in plain English, means Great Britain

disarming while no one else follows suit. We had tried to set a good example. We had urged disarmament in the air, and had even proposed the universal abolition of air forces, provided only that it was made quite certain that civil aircraft could in no case whatever be misused for warlike purposes. We had set an example by postponing year after year the completion of our 1923 programme of 52 squadrons for the Air Defence of Great Britain. But in spite of all this our policy had always been a One Power standard in the air for this country. There were four ways in which this could be achieved. First, by what he called parity at zero, namely, the complete abolition of all air forces, on the condition mentioned above. Secondly by other nations reducing first to our level, and then to such lower figures as might be agreed. Thirdly by Great Britain building up to the level of the strongest air Power in the world, and fourthly by a combination of the second and third alternatives.

It now appears, said Lord Londonderry, that there are nations which will not agree to the first alternative, the complete abolition of all air forces, and he admitted that there were great difficulties in the way. Of course there are. The greatest difficulty is that no one has yet suggested a workable scheme for preventing the warlike misuse of civil aircraft, which is to Great Britain a *sine qua non*. The Air Minister added that we could not accept the continuance of our present inferiority. If we now altered our practice that would imply no new policy, for our policy had always been a One Power standard. If we could not get that through other nations levelling down to us, then we must get it by levelling up to their strength. He went on to mention the air expansion programmes of the United States, of Japan, and of Soviet Russia, which were causing grave concern to His Majesty's Government. Our present relative weakness in the air could not be allowed to continue. These islands and the Empire as a whole must be made safe in the air. He reiterated that the Government had made parity in the air, as at sea, one of the most important points of their policy, and he ended by affirming that he should not hesitate, if necessary, to propose such concrete measures as were necessary to implement that policy.

On the same day a debate on the same subject was held in the House of Commons, and it produced a speech by Mr. Baldwin on behalf of the Government. Not for the first time, Mr. Baldwin when speaking on air matters mixed up some sound commonsense with other sentiments not so easy to approve. Mr. Baldwin does not seem ever to have thought out this subject to its logical conclusion. He wavers. He said that we could not remain indefinitely where we are. So far he was quite in agreement with Lord Londonderry. He added that he was certain that with regard to the defences of this country we had to be on equal terms with other countries in the Convention. Excellent again! But Mr. Baldwin was nervous about the effect abroad of Admiral Sueter's motion. The situation was delicate. Neither he nor his colleagues had lost hope of an agreed result at Geneva. It may be remarked that the hope expressed by Lord Londonderry had not appeared very vigorous. Mr. Baldwin went on to say that if this motion were passed Germany

would say that Great Britain had suddenly announced to the world that she was about to increase her air armaments, which would create a bad atmosphere just when the international conversations needed the best possible atmosphere. He begged the House to pass an amendment to Admiral Sueter's motion, which considerably toned the latter down, and the House obediently complied.

Would Mr. Baldwin, we wonder, have looked on Lord Londonderry's speech as likely to create a bad atmosphere abroad? When questioned by Mr. Lansbury, he explained that he had not the slightest idea of what had been said in "Another Place" that day. The Air Minister had boldly said that unless the position changed he would take steps to get more air squadrons, while Mr. Baldwin deprecated any talk about such matters for fear of creating a bad atmosphere. Certainly the liaison in the Cabinet does not seem of the best. It would appear that Mr. Baldwin echoes the ideas of the idealist Prime Minister, while Lord Londonderry faces facts.

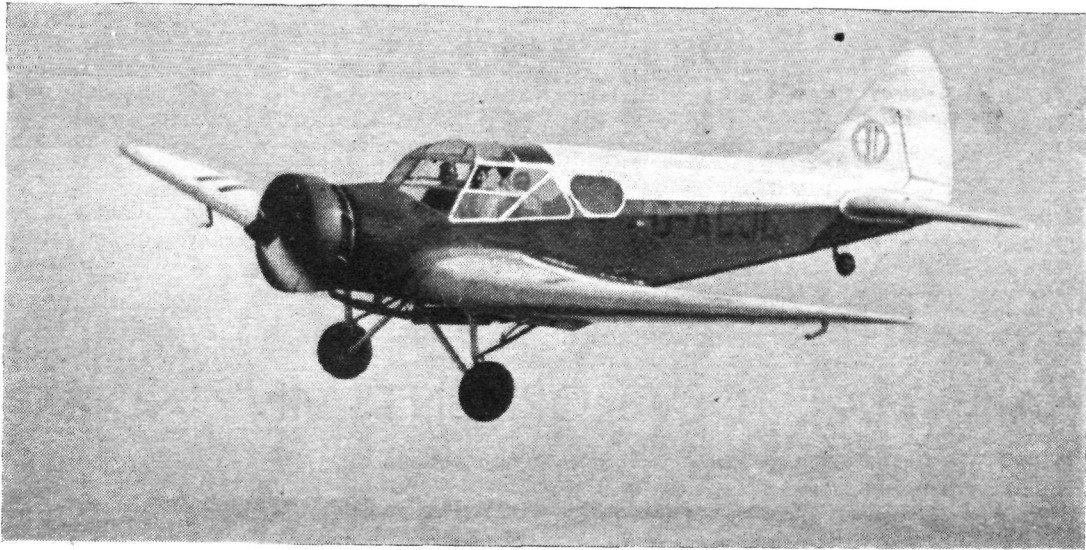
We must say that we very much prefer the attitude of the Secretary of State for Air.

Certain parties tried to read into the Air Minister's speech an intention to revise our policy, even to double our air armaments. Such conclusions were absolutely unjustifiable. Fortunately an opportunity was given to Lord Londonderry to make a second speech in the House of Lords on December 7, in which he reiterated that there was no new policy involved in his first speech. The policy of the British Government had always been a One Power standard, if not at zero, then at the lowest possible figure. But equality there must be. He took occasion in this latter speech to explain some of the difficulties in the way of internationalising all civil aircraft, and he also poured scorn on the idea of arming the League of Nations with an international force with which to subdue any aggressive Power which might defy its orders. These statements were very welcome, but for immediate purposes the most important point remains that we do not intend to continue only the fifth Power in the air.

Tact is a very desirable thing in international diplomacy, but we do not believe that an ostrich-like ignoring of facts will ever help us when we are negotiating with any foreign Power, least of all when that Power is Germany. It clarifies the whole situation when Great Britain says straight out just what she intends to do, and now there can be no excuse for any Power to imagine that so long as others keep on talking Great Britain will keep on disarming. We believe that on November 29 a greater service to the peace of Europe was done by Lord Londonderry than by Mr. Baldwin.

Actually there was no contradiction in the statements of the two Government spokesmen in the two Houses. Both agreed that Great Britain could not remain indefinitely in a state of inferiority in the air. The only difference was that Mr. Baldwin thought it a pity to say so, though he actually did say so; while Lord Londonderry not only said so but added in unmistakable terms that we intended to put the matter right. This clear statement in the House of Lords will surely be accepted abroad as the real voice of the British Cabinet, rather than the ambiguities of Mr. Baldwin.

AIR TRANSPORT & COMMERCE



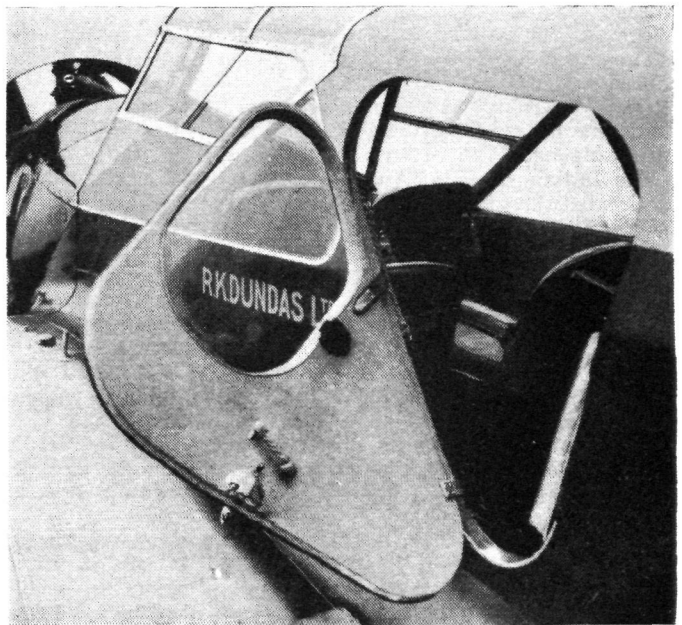
DEMONSTRATING THE "COURIER"

High-Speed Flying with Low Power

AIRCRAFT Exchange and Mart and R. K. Dundas, Ltd., British and Indian agents respectively for the machines designed and built by Airspeed, Ltd., of Portsmouth, had invited representatives of the press and others to lunch and a demonstration at Hanworth on Saturday last, with the object of introducing to a wider circle that rather extraordinary aeroplane, the Airspeed "Courier." It may be recollected that the first of these machines was designed and built at York, before Airspeed moved to Portsmouth, and that one of them was fitted up with very large petrol tanks for Sir Alan Cobham and Sqd. Ldr. Helmore to fly non-stop from England to Australia, refuelling *en route*. That project has been delayed, but work on construction has proceeded at Portsmouth, and when fitted up as a normal passenger-carrying aeroplane, the "Courier" is an extremely efficient aeroplane.

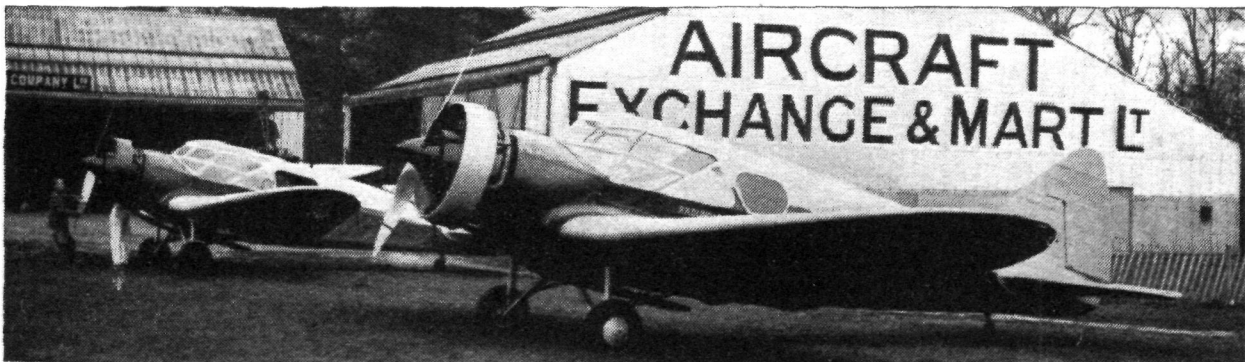
At Hanworth on Saturday two models of the Airspeed "Courier" were demonstrated, the "English" model, which is fitted with the Armstrong-Siddeley "Lynx," one of the most reliable aero engines ever produced in any country, and the "Colonial" model, which has the Armstrong-Siddeley "Cheetah" engine, a slightly more powerful version (300 h.p.) than the "Lynx."

The machines are very comfortably equipped for carrying five passengers in addition to the pilot. We had the opportunity to go up in the "English" model with Capt.



COMFORT WITH SPEED: A peep into the cabin of the Airspeed "Courier" (Armstrong-Siddeley "Cheetah" engine) which is being flown out to India shortly. (FLIGHT Photo.)

Neville Stack, and the machine is undoubtedly both comfortable and quiet. Naturally, one has to raise one's voice slightly in order to carry out a conversation, but



"CHEAP SPEED": At the Airports Conference Maj. Thornton said that if he were selling aeroplanes, this would be his slogan. In the Airspeed "Courier" it is provided to a marked extent, the "Cheetah"-engine version (nearest the camera) having a maximum speed of 170-172 m.p.h. and a cruising speed of about 152 m.p.h. As the engine is of 300 h.p. only, and the machine carries six people, this must be regarded as very cheap speed indeed. (FLIGHT Photo.)

there was none of that deafness after landing which is so often experienced after a flight in a relatively small single-engined machine. In spite of the fact that the wing is placed low under the fuselage, the view from the seats is quite good, thanks to ample window area sensibly placed.

The day was rather a "bumpy" one, but the behaviour of the "Courier" was not such as to cause any qualms. After gaining height, Capt. Stack began to draw in the retractable undercarriage. This is done by working a sort of pump handle, and one of the passengers jokingly remarked that he thought that for a moment Capt. Stack must have tried to fly the machine with the pump handle and wind in the undercarriage with the joy stick. However, the undulatory movement soon ceased, and except for the bumps the machine was remarkably steady, and

with a marked increase in speed. The day was not well suited to a demonstration, as the visibility was very poor, but the machine seemed to cruise at 135-140 m.p.h. We are informed that the "Colonial" model cruises at 152 m.p.h., and has a top speed of 170-172 m.p.h. In view of the fact that the engine is of 300 h.p. only, and the machine carries six people, this must be regarded as extremely good for a power expenditure of less than 50 h.p. per occupant at cruising speed.

The wing loading is fairly high, and so the machine lands fast, but not unduly so, and it pulls up quite quickly after touching the ground.

We are informed that the "Colonial" model is leaving this week for a flight to India, where it will be demonstrated to interested people. It will carry Lord Ronaldshay as passenger.

AIR MAIL DEVELOPMENTS IN INDIA

CAPT. TYMMS, Director of Civil Aviation in India, delivering an address at a recent session of the Indian Railway Conference at Simla, made some interesting observations regarding the developments of air transport in India. Referring to the Karachi-Calcutta line, opened in July last, the Calcutta-Rangoon extension opened on October 1, and that to Singapore in December, he said:

The Karachi-Singapore section was a joint Indian and British enterprise. The Indian National Airways would operate a weekly service between Calcutta and Rangoon. Thus, there would be two weekly services between Calcutta and Rangoon.

The Indian National Airways would also operate a daily service between Calcutta and Dacca. In this service they, as in other cases, would have no contract from the Government, would do it on a passenger basis and simply ask the Government to give them mails to carry, which would be done.

The third part of the programme was the air mail service from Karachi to the North-West India. That could only be operated as a mail service, there being insufficient advantage to passengers. They would have a contract, and would operate on the same lines as the Tata service to Madras, but its aircraft must have a minimum cruising speed of 130 miles, being 25 miles more than the machines used for Madras. The service would operate only as far as Lahore.

The North-West Frontier Province being a prohibited area for civil aviation, it was proposed to run it up to Rawalpindi, but as there would be no sufficient saving in time, service would be operated from Karachi via Indus Valley to Lahore, the stopping places being Jacobabad and Multan.

The Tata service, the Director said, was on ten years' contract. It would be extended to Colombo when the negotiations with Ceylon Government was concluded. Tata's were entitled to every consideration in connection with air services in South India. For five years they have spared no effort to establish the Karachi-Madras service.

Only once was the service a day late in going south, and they have never missed any connection with Imperial Airways; but since Tatas showed the way and the Trans-India service was announced, the Government have been bombarded with proposals to operate air services to and from any part of India.

But perhaps the most important reference of all in Capt. Tymms' address was that "the Bombay-Calcutta daily service was obviously one of the developments to come." As an inland system this is destined to be the heaviest traffic-bearing airway in the country. Its terminals are the two largest cities in India and the two largest commercial and industrial centres. They are separated by a flying distance of 1,050 miles. The distance according to the shorter of the alternative rail routes is 1,223 miles.

By the shorter rail route via Nagpur the railway journey occupies 39 hours—too long a period for modern postal transit. Tatas are interested in the scheme of running a daily air mail service between Bombay and Calcutta, and the Government are awaiting proposals from them. So far as the actual date for the start of this service is concerned, it is at present not possible to make a definite statement, at any rate not before the early part of next year.

So far it has been considered that five machines will be required, and these must necessarily be of high speed in order to cover the distances easily within the available daylight flying hours.

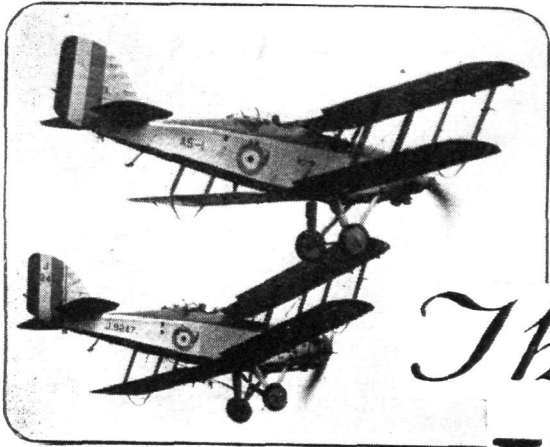
To provide for the increasing requirements of aviation, it will be necessary to undertake the partial illumination of all the chief centres on the air routes throughout India. On the Bombay-Calcutta route the particular sections where such lighting would be vitally needed would be for a distance of about 100 miles beyond Bombay and a similar distance to the west of Calcutta, the necessary illumination to be provided by large beacons. It is estimated the complete lighting of an air route may be carried out at a cost of Rs. 600 (about £40) a mile.

As for the particular type or types of machines which may hereafter be tested on this route, they will have to



FOR FEEDER LINES: This side view of the eight-seater Westland "Wessex" (three Armstrong-Siddeley "Genets") emphasises the fact that the passengers can see out of the cabin through large well-placed windows and that the wing engines impede their view but little. (FLIGHT Photo.)

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Inter-Command Communications.

A flight of four Westland Wapitis (Bristol Jupiter Engine) of No. 55 (Bomber) Squadron, R.A.F., left their station at Hinaidi, Baghdad, on Oct. 30, for a flight to India. They went to Shaibah, Bahrein, Sharjah, Gwadar, Karachi, Jacobabad, Quetta, Mirahshah, Kohat, Peshawar, and Quetta. They spent six days at Peshawar and three at Quetta. They left Peshawar on Nov. 13, and arrived back at Hinaidi on Nov. 18.

The total distance covered is 5,400 miles.

The Flight was commanded by Flt.-Lt. H. J. Gemmel.

From
"The Aeroplane,"
29 Nov., 1933.

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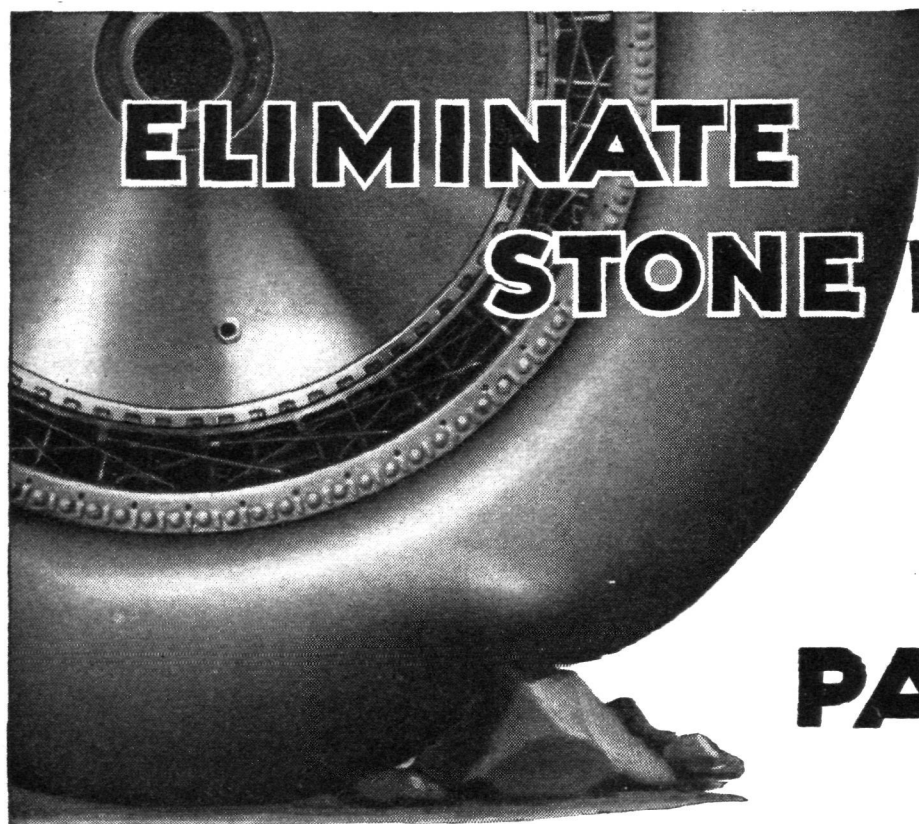
The

WESTLAND WALLACE

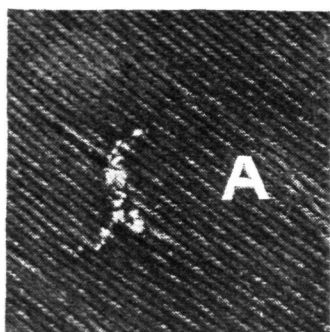


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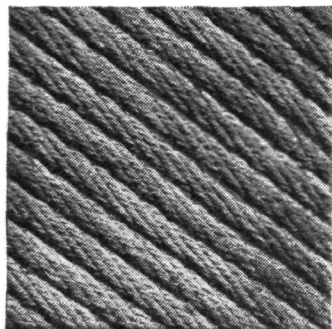
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DUTCH SPEED MAIL ATTEMPT MISCARRIES : The new Dutch high-speed Pander mailplane, "Postjager," about to leave Schiphol Aerodrome at 4 a.m., December 8, in an attempt to reach the Dutch East Indies in $3\frac{1}{2}$ days. Unfortunately, oil trouble has held up the machine in Italy, as reported below.

be capable of attaining level speed of about 200 miles an hour and a normal cruising speed of 175 miles an hour. This, as a mail carrier, would have a capacity of 1,000 lb., and would have to be provided with fuel sufficient for a non-stop journey of 1,250 miles—that is, about 200 miles longer than the Bombay-Calcutta air distance.

THE PANDER "POSTJAGER" PAUSES

THE Pander "Postjager," the high-speed mail aeroplane which set out from Schiphol Aerodrome, Amsterdam, early on December 8, on its attempt to reach the Dutch East Indies in $3\frac{1}{2}$ days, was forced, by a motor defect which developed shortly before it reached the island of Corfu, to return to Southern Italy and come down at the military aerodrome of Grottaglia. The defect was as unexpected as it was disastrous to the success of the venture, for on the first stage of the flight from Amsterdam to Rome, and again after leaving Rome for Athens, the machine behaved extremely well and kept easily to its schedule. According to a telephone message from the two pilots, Asjes and Geyssendorffer, the three motors were running perfectly, when without warning the oil pressure of the right-hand motor fell. They immediately switched off this motor, and tried without success to bring its screw to a standstill by slowing up the aeroplane. They then flew the aeroplane back on two motors to Brindisi, but could not land there, and finally brought the machine down safely at Grottaglia. During this return flight of just over an hour the two motors ran perfectly. From their examination of the right-hand motor after landing, they found that the cause of the trouble was a defect in the oil pump, but they were unable to account for it. On uncovering the three upper cylinders, they found that neither cylinders nor pistons had suffered, but that the piston rods and crankshaft were seriously damaged, and would in any case have to be renewed. The pilots added that their confidence in the motors had not been shaken and that if they could get a new one they would be willing to continue the flight. The great difficulty is that the new motor—a Wright "Whirlwind"—would have to be brought over from America. The Dutch postal authorities have agreed to leave the mail on board the "Postjager" pending a decision as to the possibility of continuing the flight. If this proves impossible, the mail will be picked up by a K.L.M. aeroplane (the new Fokker F.XX would come in useful here) and taken on to Batavia. It is hardly necessary to add that the mishap has aroused keen disappointment in Holland, where the "Postjager" has been the object of national admiration during the last few weeks. The disappointment is naturally greatest among the many

people who entrusted their Christmas greetings to friends and relatives in the East to the "Postjager," for the new engine—a cable has been sent to New York for one to be despatched at once—will not arrive in Italy before December 20.

SOUTH ATLANTIC AIR ROUTE

If the present experiments which are being carried out with the *Westfalen* are successful, the inauguration of a Germany-Brazil air mail route should take place in January, 1934. As the postal agreement between Brazil and the Aéropostale Co. (since taken over by Air-France) expires shortly, the new contract will presumably be completed for by the Deutsche Lufthansa and Air-France.

AIRWAY BEACON FOR PIETERSBURG

AN air navigation beacon has been erected $3\frac{1}{4}$ miles S.E. of Pietersburg Aerodrome, South Africa. It is 60 ft. high and has a light of 940,000 candle power, which flashes at intervals of 10 sec. visible over a visibility of 70 miles.

WIBAULT-PENHOËT HIGH-SPEED MACHINE

THE Wibault-Penhoët Co. is reported to have received an order for a high-speed mail machine of the "365 T" type. This machine will be fitted with a 690-h.p. Hispano engine. The contract specifications require a speed of over 248 m.p.h., a useful load of 1,102 lb. and a minimum cruising range of 622 miles.

MOSCOW-VLADIVOSTOK AIR MAIL INAUGURATED

THE first air mail from Moscow to Vladivostok to inaugurate the new airline left Moscow a few days ago, the machine being flown by Pilot Riabshenko. His plane was to take the post only as far as Sverdlovsk, thence another machine would carry it to Novosibirsk, a third to Krasnoyarsk, a fourth to Irkutsk, a fifth to Mogoch, a sixth to Khabarovsk and a seventh plane would take the mail to Vladivostok. The whole of the distance was to be covered in 50 flying hours.

ACTIVITY IN GREECE

DURING September, the Greek Air Traffic Company (S.H.C.A.) carried 585 passengers, 33,890 lb. of freight and 2,295 lb. of mail on the Athens-Salonika route. On the Athens-Jannina service, 410 passengers, 10,388 lb. of freight and 818 lb. of mail were carried. These figures, in comparison with those for the same month last year, show an increase of 110 per cent. for freight, and 70 per cent. for mail. In view of the fact that the company has been formed but a short while, these figures must be considered excellent.

THE AIRPORTS CONFERENCE

"Think in Terms of 250 m.p.h."*

THE construction of more municipal airports and landing grounds has been persistently advocated by the Civil Aviation Section of the London Chamber of Commerce during the past three or four years. In 1930 the Civil Aviation Section urged the Government to grant compulsory powers for the acquisition of land for aerodromes, and in the same year these powers were granted under the Public Works Facilities Act. In 1932 the Section issued a Memorandum on the provision of aerodromes and the safeguarding of sites, which was brought to the notice of the Secretary of State for Air and the Minister of Health. It was in view of the growing importance of air transport to the business community that the Council of the London Chamber of Commerce, in conjunction with the Royal Aeronautical Society, convened the Airports Conference, which was opened at the Mansion House by H.R.H. the Prince of Wales on Friday of last week, December 8. On the Civil Aviation Section of the London Chamber of Commerce, it might be pointed out here, are represented the Royal Aeronautical Society, the Royal Aero Club, the Society of British Aircraft Constructors, the Air League of the British Empire, the Guild of Air Pilots and Navigators, and the Automobile Association. Capt. P. D. Acland has been Chairman of the Section since January, 1932, and the present Deputy-Chairmen are Mr. Alan Butler and Mr. Nigel Norman.

Capt. Acland and all those associated with him had worked like Trojans in connection with the Airports Conference, and it is to their untiring energy that the success of the Conference is largely due. Some idea of the magnitude of the task of getting together so many people from all over the British Isles may be formed from the fact that no fewer than 124 towns were represented. Among those who attended the Airports Conference were six Lord Mayors, one Lord Provost, and 87 Mayors.

At the Airports Conference at the Mansion House the chair was taken by the Lord Mayor of London, Sir Charles Collett, who in welcoming the delegates expressed his pleasure in lending the use of the Mansion House for a conference of this nature. He considered the subject of airports one of very great importance. In thanking H.R.H. the Prince of Wales for coming there to open the Airports Conference, the Lord Mayor recalled that His Royal Highness was himself a user of aircraft. He regretted that the time available would not permit of having a discussion, but to make that possible the Conference would have had to meet for several days.

H.R.H. the PRINCE of WALES, who was greeted with very hearty applause, thanked the Lord Mayor of London for having placed the Mansion House at the disposal of the Airports Conference. He then addressed himself to the representatives of the cities and towns of Great Britain, and said that many of them had realised the importance of aerodromes and had actually established municipal airports. He wondered, he said, if by any chance he had been responsible in any way for putting the idea of landing grounds into the heads of any of them by getting his pilot to ascertain how near a landing ground was to any town which he proposed to visit. Thanks to the co-operation of local authorities he had nearly always been able to carry out his intention of arriving by air, although he had to admit that some of the fields he had had to use were not all that could be desired, either in the matter of size or of surface.

They might possibly wonder what fresh need had arisen for discussing the subject of landing grounds. The answer to that was that the development of air transport had made remarkable strides during the past year or so, and it was very necessary not to regard aviation as they saw it to-day, but to look ahead. The Prince then recalled that we in this country were not the first people to fly, and that our early efforts were made on foreign machines. To-day we had a great aircraft industry, and built some of the finest aircraft in the world. Hitherto our motto had been "Slow but sure," but the pressure of competition was such that we should not hold our leading position unless we speeded up. After all, the real advantage of flying was speed. People did not travel

by air because the chairs were comfortable, or to admire the view, but to get from one place to another quickly. It was necessary to realise that in some countries machines were being built with cruising speeds nearly twice as great as ours. We must now think in terms of cruising speeds of 250 miles an hour. If we allowed other nations to establish too long a lead, it would be increasingly difficult to find markets for British aircraft. We must play a leading part in carrying the world's goods, whether they went by sea or by air.

When one began to think of air travel in terms of 250 m.p.h. the advantages became overwhelming. We had been too inclined in this country to argue that distances were too short, and that fast railways made competition by air travel very difficult, and many had argued that we should concentrate on Empire air routes. His Royal Highness thought that if we confined ourselves to the long Empire routes we should be making the greatest possible mistake.

At the present time the need was for landing grounds rather than for airports. A landing ground was an open space with a wind indicator and a telephone. Aeroplanes were developed, not invented, and the development would be towards greater and greater speed. This would mean that in time the landing grounds would become airports. We had made aeroplanes fly where we wanted. The next step was to see to it that they could land where they wanted, and not merely where they could. He would ask the municipalities about to choose sites for aerodromes to make sure that they were large enough. Otherwise the fast machines of the future might be compelled to pass them by. Land became dearer and more difficult to get every year, and it was essential that the aerodrome should be near the centre of a town. If they acquired the site of their future airport now, they could use part of it for their present landing ground.

The Prince then recalled that 16 municipalities had provided aerodromes, while six others had bought sites. They could not reap the full reward of their enterprise because their lead had not been followed by others. Organised air transport was awaiting, indeed was demanding a greater response to the lead already given. Our engineers could not develop faster aeroplanes until there were a sufficient number of aerodromes to receive these faster aeroplanes. The aeroplanes, the air routes, and the airports should be planned together.

In conclusion, His Royal Highness asked those present to consider what they owed to the wheel. On carts and carriages, on trams and trains, the wheel had been the basis of the traffic which had brought them prosperity. Amid cheers the Prince concluded: "May I remind you that an aeroplane also has wheels on which it starts and lands. If you will serve the wheels, the wings will serve you."

Lord Leverhulme, who presided over the remainder of the Conference as the Lord Mayor of London was leaving with the Prince of Wales for a visit to "Bart's," thanked His Royal Highness for the very practical lead he had given them in his very excellent speech, and no less for the lead he had given by having his own private aeroplanes and his own landing ground.

Mr. C. R. Fairey said he was greatly honoured to have the opportunity, as President of the Royal Aeronautical Society, of seconding the vote of thanks proposed by Lord Leverhulme. His Royal Highness had referred to the special difficulties which many thought flying in this country had to face. In that respect we had one very great advantage not shared by many nations: we had a Royal House whose heir brought to bear his great practical experience of flying. On behalf of the aviation community he thanked His Royal Highness for all he had done for British flying.

The Air Ministry and Airports

Lord Londonderry, Secretary of State for Air, said that before proceeding to the main substance of his remarks he felt it his duty and privilege to add, on behalf of those who, with him, were officially concerned with the administration of air matters, his expression of gratitude for the gracious speech with which the Prince of Wales had opened the proceedings, and for the personal example which he was setting the nation by his use of flying in the service of his many public responsibilities.

Turning to the subject of the Airports Conference, Lord Londonderry said that he regarded the provision of aerodromes as one of the most essential needs of the present day. Since the problem was discussed four years ago it had been difficult to make progress, owing to the necessity for strict economy. At the present time the problem was as insistent as then, but there were greater hopes of its solution. The whole of aviation within this country now depended on the development of an adequate and properly equipped ground organisation.

By way of explaining the part he and his advisers would play, Lord Londonderry briefly reviewed the responsibilities of municipal authorities on the one hand and the Air Ministry on the other.

* H.R.H. the Prince of Wales at the Mansion House.

It might seem a great deal for a community to provide itself with a public aerodrome, and those who had seen Croydon might, perhaps, feel anxiety at embarking on plans to produce similar results. He would say at once that this was quite unnecessary, and no one would expect that at the outset every municipal aerodrome should have the full dimensions required for all classes of traffic. It was not only possible, but much more reasonable and right that the first beginnings should be on a small scale and that expansion should take place as traffic grew and the need for additional facilities became manifest. This was not to say that ultimate requirements should be neglected. The site should be carefully considered with a view to eventual expansion. The main consideration required for the licence necessary for an aerodrome was its safety. This question of safety involved the consideration of many details on which the Air Ministry had accumulated a quantity of information, embodied in the form of notes, which he would be happy to supply to any authority interested in them. At the same time, he would point out that there had now grown up a body of professional consultants, and he felt it was right and in the best interests of municipalities and of the Air Ministry that local authorities should seek advice from independent sources.

The initiative in providing aerodromes must rest with local authorities. It was a business matter for business men. At Croydon there was a terminal which linked us with the whole of Europe, Asia and Africa, and which would soon link us with Australia. Feeder lines were coming into being at various points along the Empire routes and on the Continent of Europe. It was essential that a similar network of feeder lines should grow up in this country, and this could only be realised if civic communities would undertake to provide aerodromes, etc. He thought those responsible for the policy of our great cities and towns would find an ever-increasing demand for the provision of aerodrome facilities, and that no city would be able to afford to be without its aerodrome. He would therefore urge local authorities to be wise in time, and he could assure them that it was the earnest wish of his advisers and himself to further the efforts of municipalities with cordial understanding and goodwill.

Sir Hilton Young at the outset disclaimed any special qualifications to speak on the subject of airports. The Ministry of Health was only a general authority, but he could assure those present of a sympathetic attitude in the Ministry of Health. There were three points at which the Ministry of Health made contact with affairs of the air. The first of these was the subject of loans. In co-operation with the Air Ministry it was the duty of the Ministry of Health to consider the subject of loans granted for the purpose of establishing airports. A practical start had been made, but it was only a start. Fourteen cities had established the working accommodation, and there were 35 actively considering plans. The amount already sanctioned as loans by the Ministry of Health or by Parliament amounted to £553,000.

The second point on which the Ministry of Health came into the picture was in connection with the planning ahead for future development. The large spaces required for aerodromes made foresight necessary. If foresight was not shown in selecting and acquiring sites, the business became very expensive. By way of an example of what would happen when foresight was lacking, Sir Hilton Young quoted the case of the railways. England, he said, would be a pleasanter place if the amenities of our railway stations had been better. He warned his audience not to make the same mistake as the railways had made.

The third point on which the Ministry of Health made contact with flying was on the subject of quarantine. Air transport had here introduced quite new problems and foresight was again very necessary. By co-operation of the Air Ministry and the Ministry of Health regulations had been drawn up which were reasonable and did not impose unnecessary obstacles. He concluded by saying that the co-operation of the Ministry of Health should not be lacking in any essentials.

Use and Running of a Municipal Airport

Mr. R. Ashley Hall had been given "The Use and Running of a Municipal Airport" as the title of his paper, but said he proposed to confine himself to running and administration.

One could easily visualise not one but a number of aerodromes at each centre of importance, each aerodrome dealing with one form of traffic. For instance, one aerodrome might deal with air mail traffic alone, another with scheduled passenger air line traffic, and so forth. At the Conference, however, they were concerned with the beginning of things. Every centre needed an aerodrome capable of dealing with present-day requirements, and capable of being expanded and developed to meet increasing traffic. The time would come when an aerodrome would have to deal with a large volume of traffic made safe by new forms of air traffic control.

Dealing with present-day conditions, the speaker said that there were two things which ought to be brought out clearly. The first was that the longer one waited, the farther away from the centre of a town would the aerodrome be. The second was that lack of aerodromes was hampering the development of commercial aviation in this country.

The traffic which the average provincial municipal aerodrome had to contend with today was made up of the use of aircraft for various commercial purposes such as advertising, joy riding, photography, air taxi work, air ferries, flight tuition and, of course, the privately-owned aircraft. As he saw it the provincial aerodrome for many years to come had to be capable of dealing with every requirement of air transport in all its forms.

Before actually discussing an aerodrome, consideration had to be given to the type of aerodrome one had in mind and he classified aerodromes into two categories which for lack of a better simile he called the "market town" of aviation and the "village" of aviation respectively.

The "market town" aerodrome would be the most ambitious type with completely equipped workshops, repair depots, etc. Naturally, facilities must be available for the supply of petrol and oil and customs facilities would also be required. The buildings would have to be of sufficient size to house a number of large aircraft, and there would probably also be an hotel and shops and office buildings dealing with everything pertaining to air transport. The "market town" airport would probably serve a radius of some 25 to 30 miles.

Mr. Ashley Hall pointed out that if one decided to establish the "market town" class of airport it was not necessary to incur immediately the full expenditure. A start could be made with a landing area of sufficient size to deal with the largest and heaviest aircraft and with sufficient space for development. Hangar accommodation could be added as required, and night flying equipment could in the early days be of the emergency type. Radio equipment should be left until the Air Ministry installed it at its own expense and temporary arrangements could be made with the local customs facilities to have a call upon their services when required.

The "village" type of aerodrome would adjoin the smaller towns in the area served by the "market town" airport. Here the actual landing area need not be quite so extensive, but accommodation would be needed for casual visiting aircraft and for the actual aircraft operating from each particular centre. Fuel supplies were, of course, necessary and also a telephone and some sort of accommodation for passengers. Night flying equipment need probably only be of the emergency type. The servicing arrangements need only be sufficient to deal with running repairs. Like

its big brother, the "village" type of aerodrome could be started in a small way. If sufficient land were reserved for development, the actual initial aerodrome could be in the form of an "L" or a "T," the remainder being put to some other useful purpose until required. A small hangar, a groundsmen, a petrol pump and a telephone would suffice as a beginning. Whichever aerodrome it was decided to start with, his advice was to start off with a definite plan in mind. This included not only a plan of development as to the position and type of aerodrome, but also included giving careful consideration to the town-planning of the immediate surroundings. It was essential to avoid high gasometers or factories with chimneys being erected near the site, and to protect the flying approaches to the aerodrome he suggested that they should try to lay their plans so that the aerodrome adjoined a public park or recreation ground.

Having selected a site and got all the preliminary work done, the next question that arose was the policy of revenue. The new aerodrome would be a baby, and, like other new babies, would need sympathy and encouragement. That being so, he begged them not to leave it to the mercy of some sub-committee of an old-established committee of the council, but to form a separate airport committee. He advised them to resign themselves to being aerodrome proprietors only, and leaving all questions of operating, etc., to private enterprise.

As regards petrol and oil, it might be necessary for the aerodrome proprietor to instal the initial service station, but the time might come when it was a convenience to have a number of service stations at various points around the aerodrome and he would thus advise them to let anyone put up a petrol station in return for a certain sum per pump.

Turning to the subject of trading activities at the airport, Mr. Ashley Hall suggested that no consideration be given to the granting of monopolies. An aerodrome ought to be open and available to anyone who liked to come and trade there in any capacity. First of all, arrangements had to be made for a schedule of charges for the housing of aircraft on short or long terms. He suggested that so long as a tenant paid his housing charges he should be permitted to do what he liked with his aircraft. The aerodrome proprietor should say to himself, "I have two things to let: space inside my own buildings and space on land adjoining the aerodrome." The rentable value of such space had to pay a return on the capital invested, and consequently it would be worth so much in ground rent where tenants erected their own premises, and so much more where they occupied the premises of the aerodrome proprietor.

Although he was against monopolies, he thought it might be worth while to give tenants special consideration, and suggested that it would be worth while in the early days to assist and encourage the first in any particular category by offering privileged terms for a given period. In this way one would get a number of tenants actively engaged in developing their own type of business, and although they were all on privileged terms, it was not as dangerous as offering privileged terms to one unit covering the whole range of activities.

On the subject of landing fees, Mr. Ashley Hall said that this was a fruitful source of controversy. His own opinion was that landing fees should not be charged. The housing fee for aeroplanes should include the free use of the aerodrome. To charge a landing fee would, he thought, be like paying toll to get into a street in order to get to a shop, and so he was all in favour of free landing for all casual aircraft.

A different case was obviously that of the aircraft which used the aerodrome regularly. Here it would obviously be unfair to give free landing facilities. He still thought that no landing fee ought to be the rule, but suggested that a small capitation fee should be paid by the operator on every fare-paying passenger collected or discharged at the aerodrome, and a similar due on freight. This system had the added advantage of relieving an aircraft operator from a heavy overhead expense in his early years and yet of allowing the aerodrome proprietor to share in his success and expansion.

Turning to the subject of administration, Mr. Ashley Hall said that responsible to the aerodrome committee there must be an administrative staff, carrying out the daily management. The size of this staff must, of course, depend on the volume of traffic. In the early days there were ways of saving a considerable amount of the expense of an administrative staff. One such way was by sharing the services of the staff with an aeroplane club. An aeroplane club had to employ a secretary and some clerks. The secretary could also be airport manager on behalf of the municipality. The aeroplane club had to employ a responsible man as chief flying instructor. He could be second in command and in charge during the airport manager's absence, and could also control the flying discipline at the airport. The club would also employ a ground engineer, who could help in looking after the Corporation's property.

A club established at an airport of this nature must not compete with traders trying to establish aviation on an economical basis, but must help them. To enable the club to do its work, the municipality should give it every assistance and encouragement. The social side of the club was in itself an asset, and ways and means should therefore be found of enabling the club to have attractive headquarters.

Mr. Ashley Hall said he was not sure that flight tuition might not be the exception to prove the rule of no monopolies. Not only was flight tuition the lifeblood of a club, but it was also work that had to be carried out efficiently under proper control and he thought it might be quite wise, especially in the early days, to confine such work to a responsible organisation, such as a good club.

Commercial Use of Air Transport

Major R. H. Thornton, who is a director of the Blue Funnel Line, and chairman of the Liverpool Aero Club, made a very excellent speech, in which he managed to combine humour with a great deal of commonsense and very practical argument. The previous speaker had not left him very much time, but Major Thornton made the most of what time was left, and got his audience with him from the very start.

Starting with the explanation that he was a representative of a moribund calling, Major Thornton said that he was trying to find ways and means of keeping the flag flying. One very important item in smoothing out difficulties was personal contact, and he had tried to make use of flying wherever possible. The position in Great Britain at present was, however, such that he found himself very hampered in his efforts to make good use of the aeroplane. Whereas only 22 cities had so far either established aerodromes or purchased sites for them, there were 185 municipalities which had shown a tentative interest. "Tentative" was the right word, and the impression had been created that most local authorities did not regard the provision of aerodromes as a matter of immediate and practical importance. It was the word "practical" that he wished to keep to the forefront. Flying was practical because it so happened that if one wanted really rapid transport, flying was the only way to get it at reasonable cost. By way of an example, Major Thornton quoted a personal experience. In May of this year he was touring France by car, accompanied by a passenger. On the excellent French roads the average cruising speed was 48 m.p.h., and the petrol consumption was 17 miles to the gallon. In September he flew, with a companion, on a week's tour in France. The average cruising speed was 96 m.p.h. and the petrol consumption 18 miles to the gallon. Flying to-day was not

as cheap as it might be, mainly due to successive experiments in design and a limited selling market for each type produced. If those present would provide places for "practical flying" to go to, then the aeroplane would become what it inherently is, a cheap as well as an economical form of transport.

The material growth of civilisation was, in the view of the speaker, due not to any increase in first-class brains, but to the improved means for enabling those brains to range over a wider field and convey their ideas and discoveries to a larger world. By way of an example, Major Thornton quoted the modern "chain stores." They attributed their success to personal supervision and admitted that their organisations could not be extended until their leaders could be conveyed more rapidly from place to place. Their only hope was the aeroplane. If he were selling aeroplanes, Major Thornton would choose as his slogan "Cheap Speed." The personal touch between principals was what counted. He quoted King Edward as saying that there was no controversy which could not be settled by two men in two comfortable chairs, and with two good cigars.

From personal experience, Major Thornton could say that he was being prevented from using the aeroplane to increase his efficiency. The total number of manufacturing towns to which at present he could fly without thought or trouble amounted to the ridiculous figure of nine. Incredible though it might seem, he could not fly to Sheffield, Rotherham, Rochdale, Derby, Halifax, Huddersfield, Wolverhampton, Barrow, Darlington, Luton, Swansea, Warrington, Dundee, Middlesbrough, Sunderland, Chesterfield, Oldham, or a dozen other towns. It was true that he had once tried to fly to Swansea, but "never again." Practical flying was marking time for want of landing grounds.

Major Thornton summed up his advice in four observations. Existing traffic was no criterion of the potential traffic. He urged those present not to adopt a "wait and see" policy, but to act at once. Flying was capable of being as widely used as any other form of traffic, but aerodromes, like roads and car parks, were essential amenities which it was the duty of the municipalities to supply. He wanted to correct any idea that the aircraft capable of rising vertically were now within the visible horizon, and even if produced there would be progress in the opposite direction: that of specialised fast-flying aeroplanes, which would require aerodromes as large as those of to-day. The distance of aerodromes from the centres of towns would be vitally important in the future, and would become more and more important as the speed of air travel increased. An aerodrome 25 minutes from a town would seem a long way away when 25 minutes represented 80 miles in the air. At one time it took him less time to fly from Liverpool to Heston than to get from Heston to St. Mary Axe, in the City of London.

Lord Leverhulme then thanked the four speakers, Lord Wakefield for the dinner he was giving that evening, and the Lord Mayor for granting them the use of the Mansion House for the Airports Conference.

The Lord Mayor of Birmingham thanked Lord Leverhulme for presiding, and told his listeners that Birmingham had just bought ground for an aerodrome.

LORD WAKEFIELD'S DINNER

In the evening of the same day Lord Wakefield entertained at the Savoy a large and distinguished gathering, which included nearly 100 Lord Mayors, Lord Provosts, Mayors and Provosts of towns and cities in the British Isles, and many town clerks and other county and borough officials. Lord Wakefield presided, and the principal guest of the evening was Lord Londonderry, Secretary of State for Air.

After the toasts of His Majesty the King, Her Majesty the Queen, His Royal Highness the Prince of Wales, and the other members of the Royal Family had been drunk, the chairman rose to introduce Lord Londonderry. Many people, he said, had devoted much time and thought to the furthering of aviation as a means of transport and as an individual pleasure. The Prince of Wales by his speech to the Conference that afternoon had given a tremendous impetus to aviation which would release in his hearers fresh energy and enthusiasm. His characteristic personal touch gripped their imaginations. Lord Londonderry was himself a pilot, and they all wished him the best of luck in his forthcoming tour. The chairman then read a message from the Master of Sempill expressing the best of wishes for the success of the Conference.

Lord Londonderry, in proposing the toast of "The Future of British Aviation," said that prophecies about aviation, as about politics and racing, were not always profitable. Never before had representatives from so many municipalities been gathered together. He himself was not without

municipal experience, having served on the Dublin Corporation. It was a national duty to develop aviation for the benefit of mankind and civilisation, but our national conservative spirit must be overcome in aviation, if not in other directions. There were present that evening many to whom we owed our present premier place in the world's aviation. On their brains could we rely to keep British aviation where it was. Our postal service should be quickened up by more extensive use of the air mail, even within Great Britain. 300 m.p.h. was not too much to expect from mail machines. While our present Royal Family was with us the country would never lack leadership in the development of air transport. Lord Londonderry concluded by expressing a wish to couple with this toast the name of Capt. H. H. Balfour.

Capt. Balfour, in a vigorous speech, then replied to the toast. It was, he said, the first time that he, as a back-bencher, had the right to speak to a Cabinet Minister without that minister being able to reply. Great credit was due to Lord Wakefield for all that he had done for aviation, and the public never missed an opportunity of paying him tribute. An instrument which had been developed in our generation must always be used for the benefit of mankind. All this loose talk about internationalising aviation was nonsense; our needs and requirements were different from other nations, and it was up to us to look after our own interests and not be rushed. Aviation, Capt. Balfour continued, was a force to be used in the interests of peace and humanity. It was necessary to be bold and to think widely. His advice to any municipal official present who had not flown was to get up into the air, where he would find mental elevation and relaxation from material worries. The control of British aviation by an international organisation situated, perhaps, at Geneva would give a death-blow to a young and healthy industry.

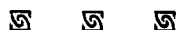
Lord Leverhulme, the President of the Chamber of Commerce, in proposing the toast of "The Development of Municipal Airports," emphasised that owing to the generosity of their host, over 100 towns and cities had sent representatives. The air was becoming the normal medium of travel, but more airports were necessary. Air communication without airports was analogous to travel by rail with intermediate stations obliterated. He regretted that among all the items of commerce conveyed by air, that commodity in which he was most interested was absent.

The Rt. Hon. Sir Crawford McCullagh, the Lord Mayor of Belfast, replied to the toast. He started off by emphasising the fact that Belfast was in Northern Ireland, and therefore part of the United Kingdom (loud cheers). Belfast was the first municipality in the United Kingdom to establish an airport, and they were proud that they had the advice of Sir Sefton Brancker. Their airport had not been a financial success, but they were still prepared to spend more on it, for they realised that municipalities must not expect an immediate return when establishing airports. The time had arrived for a definite survey of the question, and the only solution to ultimate success was co-operation between the Air Ministry, the Government, and the Post Office. People must look ahead, the Lord Mayor continued, and not expect an immediate return; those who condemned you now would appreciate you when you were dead. They were indebted to the Chamber of Commerce and to Lord Wakefield, and were come together to do what was best for aviation. The dinner was bound to bear fruits.

Sir Alan Cobham, in supporting the response, lead one to believe that all he had been doing toward airport development during the last few years had been to a large extent wasted. He admitted that the Municipal Airport Movement had been an utter failure. (Incidentally he did not suggest who was chiefly to blame.) Nothing could happen in aviation until every town and city had an airport. They must not forget that a similar conference had been held some years back, which had not borne the expected fruit. Sir Alan then made the unique suggestion that the Government should become land owners on a large scale and purchase land for municipal airports. With an outlay of £10,000,000 there could be made within the space of ten years £100,000,000. He then drew attention to the fact that municipalities were already widening roads due to the fact that the number of motor vehicles was increasing, and drew from that the conclusion that no aerodrome was too big for future traffic.

Mr. C. R. Fairey then proposed the toast of the Chairman. Lord Wakefield had, he said, been described as the Patron Saint of Aviation, but he was more than that; his name on any undertaking was a guarantee of its righteousness. Speaking on behalf of the whole aviation community he could state that Lord Wakefield held in their hearts the very greatest affection.

Lord Wakefield, in reply, stated that it was a great honour to entertain, and be identified with the Conference. It was a good thing to receive praise, for it had an inspiring influence.



The Royal Aero Club

ON the occasion of the opening of the Ladies' Room at the Royal Aero Club on Friday, December 15, there will be held a Cocktail Party from 6.30 p.m. to 8.0 p.m. The tickets are 5s. each, which includes cocktails and refreshments. The Club will be closed from 3.0 p.m. on Saturday, December 30, for the purpose of holding a Staff Dance.

Captain J. H. B. Rodney

CAPT. THE HON. JAMES HENRY BERTIE RODNEY, who died following injuries received in a fire which resulted in the destruction of the Herony, Whitchurch, Hants, on Saturday, December 9, served in the R.A.F. during the war, was mentioned in despatches and received the M.C. He was elected a few days ago to the Court of the Guild of Air Pilots. A few years back he was chief instructor for National Flying Services at Hanworth.

Flt. Lt. Allen's accident

It is with regret that we have to record the death of Flt. Lt. James Bernard Allen as a result of injuries received in a crash on Tuesday, December 5. Flt. Lt. Allen was private pilot to the Duchess of Bedford, and was apparently flying back to Woburn from Hooton. According to reports he was flying low, feeling his way in the darkness, perhaps with his engines throttled back a little, and suddenly saw ahead of him, in the light of his head lamp, some high tension cables. To avoid these he did a sudden steep turn, presumably stalled, and dived into the ground. After the crash he was taken to

hospital with serious injuries, a broken thigh, a broken leg, and head injuries. He died later in the evening. Flt. Lt. Allen has been the Duchess of Bedford's pilot since 1930. He served in the Gloucestershire Regiment from 1914-1916 and, transferring, served with the R.F.C. and R.A.F. until 1927. He was chief instructor and aerodrome manager to the Liverpool and District Aero Club from 1928-1930, and a member of the Guild of Air Pilots and Navigators.

A Pioneer passes

It is with regret that we record the death of Herr Karl Jatho, a German pioneer of flying. It has been claimed that Herr Jatho was the first man to fly in a motor-driven aircraft, having made a flight in a machine of his own design in August 18, 1903—four months before that of the Wrights. Herr Jatho was 60 years of age, and from his house in Hannover he had the satisfaction in late years of seeing machines pass over on the London-Berlin route.

New British Representative on the C.I.T.E.J.A.

SIR MAURICE AMOS, K.B.E., K.C., has been appointed by the Secretary of State for Air to be senior representative of the United Kingdom on the Comité International Technique d'Experts Juridiques Aériens in succession to Sir Alfred H. Dennis, K.B.E., C.B. Sir Alfred has held office since the formation of the committee in 1926.

Some British Triumphs

with

NAPIER Aero Engines

1918 A Napier-engined D.H. aeroplane climbed to a height of 30,500 ft. in 66 min., the greatest height at this date reached by an aeroplane.

1919 A Napier engined D.H. aeroplane won the Aerial Derby. Speed, 129.3 m.p.h.

1921 A Napier engined Gloster aeroplane won the Aerial Derby. Speed, 163.4 m.p.h.

1922 A Napier-engined Supermarine flying boat regained the Schneider Trophy for Great Britain at a speed of 149 m.p.h.

1923 A Napier-engined Gloster aeroplane won the Aerial Derby. Speed, 192.4 m.p.h.

1926 The first non-stop crossing of South Atlantic Ocean carried out by Commandante Franco flying a Dornier flying boat with two Napier engines.

1927 Schneider Trophy regained for Great Britain by a Supermarine-Napier seaplane flown by Ft.-Lieut. S. N. Webster, A.F.C. Speed, 281.669 m.p.h. Two machines completed the course—both fitted with Napier engines.

1928 The greatest formation flight ever carried out was made with four Supermarine-Napier Southampton flying boats, each fitted with two Napier engines. The machines flew from England to Australia, round Australia, and back to Singapore, covering 180,800 engine miles without mechanical trouble.

1929 The first non-stop flight from England to India was carried out with a Fairey monoplane fitted with Napier engine. 4,130 miles in 50 hr. 38 min.

1930 For the fifth successive year Napier engines were selected by the Royal Air Force for their annual Service flight from Cairo to Cape Town and back. As on previous flights, no mechanical trouble was experienced.

1931 The first and only non-stop flight from England to Egypt was carried out with a Fairey monoplane fitted with Napier engine. 2,857 miles in 30 hr.

1932 Captain Sir Malcolm Campbell set up a World's Land Speed Record of 253.968 m.p.h. with his Napier-engined "Bluebird" car.

1932 Fourteen officers and 534 men were transported from Ismailia to Iraq and back—a distance of 1,728 miles over nearly waterless desert. The aircraft used were Vickers "Victoria" troop carriers, each fitted with two Napier Lion engines.

1933

Squadron-Leader O. R. Gayford, D.F.C., A.F.C., and Flight-Lieut. G. E. Nicholetts, A.F.C., by flying a Fairey (Napier) monoplane from Cranwell, England, to Walvis Bay, South-West Africa, set up a World's long distance non-stop flight record—a distance of 5,309 miles covered in 57 hr. 25 min.

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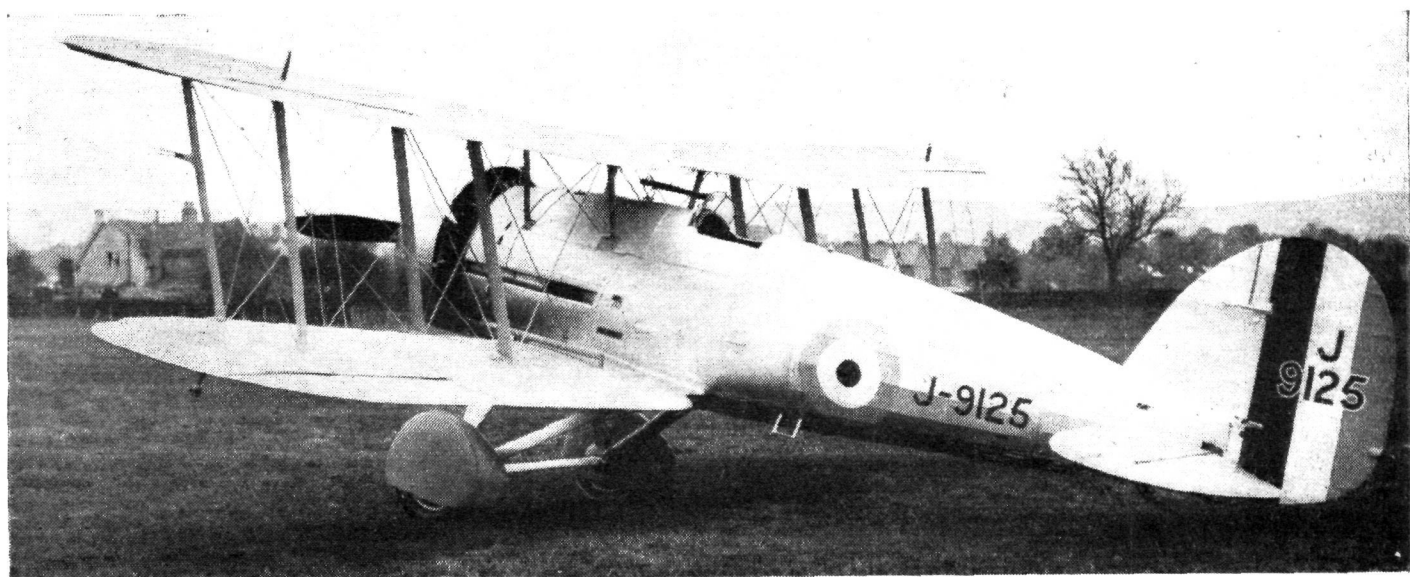
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THE GLOSTER "GAUNTLET"

A Day and Night Fighter with Bristol Mercury IV S. 2. Engine recently Ordered in Quantity for the R.A.F.

TWO great air powers—America and France—have recently given orders for large numbers of single-seater fighter aircraft for re-equipment purposes. The machines, in both cases, are low-wing monoplanes. We in this country still prefer the biplane for military work, chiefly on the grounds of the manoeuvrability of the type. So deep rooted is our preference that not only have the Air Ministry adopted yet another biplane fighter, but the machine is a two-bay type. The last two-bay fighter used by the R.A.F. was of war-time design—the Sopwith "Snipe." It seems that the main reason for the adoption of monoplanes abroad is that, generally speaking, a monoplane will prove faster than a biplane. There is much loose talk about the speeds of fighters these days. A nation will say "We now possess the fastest single-seater fighter in the world," but it often shows reluctance in mentioning at what altitude that aircraft attains its top speed. It is our own policy to use fighters having high performance at great altitudes, and there can be little doubt that our machines in this class are matchless. Although new machines adopted by other powers may be fast "on the level" (we do not use this expression in the American sense), especially near the ground, our fighters would still be "top dogs" in an aerial combat owing to their retention of speed and powers of manoeuvre at the great heights at which future aerial battles will (or should we say "would") be fought.

Speed is but one desirable feature in fighting aircraft; there are many others. Great emphasis may be laid on one particular quality in a fighter—speed, climb, manoeuvrability or fighting view—which may entail the sacrifice of other desirable properties, but a machine which possesses each of these qualities to a very high degree and maintains them all at altitudes, which can be safely used for night flying, which carries a large fuel load for long patrols, and which is fitted with wireless—such a machine we standardise in the R.A.F., and the latest machine in this class, the Gloster "Gauntlet," has just been adopted by that Service.

We congratulate the Gloster Aircraft Co. on their "come back." The last Gloster production type fighter was the "Gamecock," an aircraft well beloved of fighting pilots. There was a series of fighters all similar in general arrangement to the "Gamecock"—the "Grebe" (the forerunner of the "Gamecock"), the "Gorcock," the "Guan," and the "Goldfinch." Not long after the "Goldfinch" had been built, the company produced a new fighter design quite different from their squat single bay biplanes, with the type number of S.S.18. This machine, a two-bay biplane with Bristol "Jupiter VII" or "Mercury" engine, was exhibited at the Aero Show,

Olympia, in 1929. Later the type was modified, fitted with a "Jupiter VII F," engine and Townend ring, and used for experiments with outboard guns. Six guns were carried, two Vickers in the fuselage and four Lewis in the wings. This machine was known as the S.S.19 or "Multi-gun Fighter." Even with its formidable armament and very comprehensive military equipment it had a speed of roughly 190 m.p.h. at 15,000 ft., to which height it would climb in 9 min. 30 sec.

When the time came for "Bulldog" replacement types to be tried out, the S.S.19 was stripped of its four Lewis



MODERNITY: Showing the exceptionally clean nose and undercarriage. It is likely that the nose of the production "Gauntlet" will differ from that shown, as a newer type of "Mercury" and cowling may be used.

(FLIGHT Photos.)

guns, fitted with Bristol "Mercury IV S.2" geared and supercharged engine cowl by a Townend ring, had its wheels faired by spats, was modified in a few other minor details and given the type number S.S.19B. We would recall here that the Gloster development machine has appeared at the Aero Show and in the New and Experimental Types Park at two R.A.F. Displays, each time as a different type—the S.S.18, S.S.19 and the S.S.19B ("Gauntlet"), and each time bearing its original number, J.9125. Thus are our fighters developed.

The Gloster Co. put "all they knew" into the design, construction and development of their machine, and many were those who expressed their delight when it was made known that several of the type had been ordered for the R.A.F. as day and night fighters. Soon after this announcement, the type was christened the "Gauntlet" despite the fact that the Air Ministry had previously issued an order that single-seater fighters were to be known by names beginning with F.

Although the "Gauntlet" is the first machine powered by the "Mercury" to be adopted, we do not doubt that this new Bristol engine will give service equally as fine as its larger brother (or is it sister?) the "Pegasus." The "Mercury" engine, which drives a wooden airscrew, is designed specially for installation in high-performance fighting aircraft and develops 570 h.p. at 14,000 ft. The bare weight is 945 lb. It now seems likely that a "Mercury" of later type than the IV.S.2 will be fitted to the production "Gauntlets," which will use a new type of engine cowling.

The "Gauntlet" is certainly one of the strongest fighters ever built. The two-bay wing cellule ensures rigidity for aerobatics and while diving at high speeds; terminal velocity dives have frequently been made. During these manoeuvres the deflection of the spars, which are of high-tensile steel strip, is very small indeed. It would seem that the Gloster Co. is finding the "two-bay" arrangement of great value in fighters—the "Gnatsnapper" Fleet fighter, originally a single-bay type, now employs a two-bay structure similar to that of the "Gauntlet." Frise ailerons on all four wings ensure excellent lateral control. The fuselage, a rectangular structure faired to an oval section, is built in three sections—the engine mounting, the centre portion (built up of square tubes with wire-bracing almost eliminated) and the rear section, which is a braced structure of round tubes. The equipment specified for Day and Night fighters is all carefully stowed away. This includes two Vickers guns with their C.C. gear and 1,200 rounds of ammunition, wireless, oxygen and night-flying equipment. Tankage for 81 gallons of fuel and 6 gallons of oil is provided. Four 20-lb. bombs may be

CERTIFIED EXTRACT FROM MARTLESHAM REPORT
M/572/3, DATED AUGUST, 1933

S.S. 19B Single-seater Day and Night Fighter Aircraft recently named the "Gauntlet"

All up weight	3,858 lb.
Tare weight	2,704 "
Climb—	
1,000 ft.	32 secs.
5,000 "	2 min. 42 secs.
10,000 "	5 " 24 "
15,000 "	8 " 12 "
20,000 "	11 " 43 "
Service ceiling	33,350 ft.
Speed at sea level	169.5 m.p.h.
5,000 ft.	184.5 "
10,000 "	199.5 "
15,000 "	214.0 "
16,500 "	215.5 "
20,000 "	212.5 "
Stalling speed	54.0 "

Diving tests—

Total flying weight, 3,550 lb.
Centre of gravity position, 6.4 in. aft of datum point.

Height at Commence- ment	Height at Maximum A.S.I.	Maximum A.S.I.	Maximum R.P.M.	Height at Commence- ment of Recovery	Height Level Flight
Ft.	Ft.	M.p.h.		Ft.	Ft.
20,000	13,000	275	2,600	12,000	9,800
16,000	9,000	290	2,600	8,000	5,800

carried in a rack in the port bottom plane. Although a Hucks starter claw is fitted, an R.A.E. Mark IIA compressed-air starter will be generally used. The wing-tip navigation lights are carefully built into the leading edge, and even parts of the Holt flare brackets are faired.

Small "doors" in the sides of the cockpit facilitate entry and exit, for the modern fighting pilot with his parachute and other accoutrements is no fairy.

The machine is easy to maintain under adverse conditions, and the engine, guns, belt boxes, wireless, etc., are all easily accessible.

It is desirable for a machine which is used for night flying to have no tricks when landing. The new "Gauntlet" lands slowly, and by the use of brakes the landing run is kept short. The S.S.19 ran about 170 yd. on landing; it is unlikely that the run of the "Gauntlet" will differ to any great extent. Although a two-bay biplane, the "Gauntlet" provides a fine fighting view for the pilot; fine, that is, as the fighting views of conventional tractor biplanes go. The centre section of the top plane is narrowed in both thickness and chord—a feature to be found in Gloster fighters for many years back.

We think the R.A.F. will like the "Gauntlet."

THE HOUSE OF LORDS AND AIR POWER

ON December 7 the question of air power was again discussed in the House of Lords on a motion for papers by Lord Allen of Hurtwood (Nat. Lib.).

He said that Lord Londonderry had foreshadowed an increase of air armaments. He said that a knock-out blow could be delivered to London probably in 48 hours. He suggested international ownership of civil flying and the provision of an air force for the League of Nations.

Lord Mottistone denied that London could be paralysed by a blow from the air. That was a complete delusion, although in certain cases great damage could be done. The most absurd exaggerations were made about the use of poison gas from the air. The problem of using gas was a very complicated one.

Lord Londonderry welcomed the chance of correcting some of the very far-fetched conclusions and mis-statements which had been made after his speech on November 29. He repeated extracts from that speech to dispel the idea that he had foreshadowed a new policy of a great increase of armaments. Over ten years ago the Government of the day laid down a Home Defence policy which, in order to set an example and to encourage disarmament, had been repeatedly postponed. At Geneva they had always taken up the principle of parity, which was to be found in the British Draft Convention, which had been accepted in principle by every nation at the Disarmament Conference. But he had indicated that in the absence of air disarmament by other Powers they could not indefinitely postpone that old programme. But over and above the large increases which had already

taken place in the strength of foreign air forces, a number of countries had lately decided upon, and in some cases actually embarked upon, new programmes of expansion. The Government still adhered to the policy of the British Draft Convention. There could not be any challenge or threat in his statement. He then explained some of the difficulties of international ownership of civil aircraft, both public air liners and private machines. He said that so far no satisfactory scheme for the internationalising of civil flying had been put forward. He repeated the words he used at Geneva last February:—"Any scheme for the internationalisation of civil aviation must satisfy at least the following conditions. In the first place it must be so framed as effectively to prevent all possibility of the resources of civil aviation being used for military purposes in the event of an outbreak of hostilities. In the second place, it must not prevent or hamper the fullest development of aviation in every country for civil and commercial purposes, nor must it restrict freedom in the realm of experiment and research."

Lord Londonderry then passed to the suggestion of internationalising air armament. He called that the erection of a super-State at Geneva, and said that the Government could not contemplate such an idea. The League was a pacific body, not one to make war. He enumerated some of the difficulties in organising an international force. He concluded by saying that certain powerful nations did not belong to the League, and a super-State would require the adherence of every considerable nation.

POSSIBLE FUTURE DEVELOPMENTS OF AIR-COOLED AERO ENGINES

By A. H. R. Fedden,* M.B.E., F.R.Ae.S., M.I.A.E., M.I.M.E., M.S.A.E.

IN reviewing the possible future development of aircraft engines, I propose to confine myself to air-cooled engines for the immediate future—what we may expect during the next ten to fifteen years—as being the most profitable subject for discussion. I do not propose to attempt to consider power plants which are remotely conceivable for aircraft—such hardy annuals as petrol turbines, rocket propulsion, swash-plate engines, etc.

Naturally, being connected with a firm producing air-cooled aero engines only, my activities are directed into the exploration of the air-cooled engine field, and in endeavouring to find as many openings as possible for the employment of direct air-cooled power plant for aircraft.

I believe there is a great deal of important and interesting work that will be accomplished during this period, but I suggest that it will be more along the lines of development rather than any radical change, and I hope that you will not think I am too conservative in my opinions.

I propose to confine most of my remarks to the four-cycle engine, as I am of the opinion that this type of engine is most likely to predominate during the period considered.

It may be fairly stated that the direct air-cooled engine holds an important position in aircraft in all countries of the world, and the object of this paper is to endeavour to suggest the lines on which this position can be maintained for the future.

TREND OF AIR-COOLED AERO ENGINE DEVELOPMENT

The design and development of an aero-engine power plant is nowadays such a comparatively long process, that the aero-engine designer has to lay his plans some years ahead, and, having fixed upon a certain type, it is usually impossible to make any radical change to the layout without entirely destroying the design. The difficulties of the aircraft designer are fully appreciated, but the engine-maker sometimes looks with longing eyes upon the facility with which aircraft weights are apt to increase when necessity arises.

To increase the performance of aircraft, I believe I am correct in stating that one of the easiest ways is to substitute a larger engine, provided the weight, shape, etc., are suitable. Broadly speaking, this has been the main line of attack to date, and sizes of engines have been, and still are, creeping up. I am quite convinced that a halt must be called to this procedure, as it does not make for efficiency and is apt to lead to a vicious circle, entailing larger and heavier machines, increased drag, larger fuel tanks, etc. By this I do not necessarily mean that the aircraft designer can continue to raise his performance curves by the use of less power, but rather that the engine maker must provide him with the same, or more, power from a considerably more efficient engine.

At the present time, about 13 to 14 cruising horse-power per litre (61 cu. in.) is accepted as the limit to take from an aircraft engine of current power/weight ratio, if long life between overhauls may be expected. This seems to me, with all the development at the back of an aero engine, a low figure, and should be capable of being considerably improved upon.

I feel that the aircraft engine of the future must follow the trend of the motor-car engine in volume reduction, and we must aim at giving considerably more power from a given capacity, both for take-off and continuous cruising power. In 1920, 15 rated horse-power per litre (61 cu. in.) was considered a reasonable output from an aviation petrol engine; to-day the figure is about 22-26 rated horse-power per litre, and I hope to see 40-50 rated horse-power per litre attained within the period under review.

I do not visualise any startling reduction in weight, as changes will have to be made to accommodate additional stiffness and bearing loading capacity, but, with the de-

velopment of such a type of engine, many advantages will accrue, such as reduction in scale of the engine, increased overall efficiency, and reduced fuel consumption.

Increase in Compression Ratio

Raising the compression ratio is one of the most useful means of obtaining a higher engine performance. Briefly, its effect is to increase the brake mean effective pressure, thermal efficiency, and maximum explosion pressure, and to decrease the residual exhaust gas temperature and fuel consumption.

The improvement obtained is limited by detonation, which problem has already been attacked with a fair degree of success by the fuel technologists.

Effects of Increased Compression Ratio on Design

The increased gas pressure can be offset, to some extent, by higher inertia loading, obtained by increasing engine speed. Stresses in articulated pins and gudgeon pins will be increased, and these parts will need attention. In certain quarters it is felt that pistons will have to be modified to withstand the higher loads, but I think that if pistons are of sufficient section to provide adequate cooling, they will be strong enough to stand the increased loads due to increase in compression ratio. The key to the problem would seem to be, therefore, is it possible to provide adequate cooling to the piston without increasing the weight to dangerous limits? I would suggest that this is possible on the smaller bore cylinders, but, when it comes to the larger size pistons, the problem will undoubtedly be serious in order to prevent abnormal piston temperatures with consequent ring sticking.

The provision of satisfactory exhaust valves and seats is rendered easier by the reduction in exhaust gas temperatures, due to the higher expansion ratio.

Fuels

From the aspect of detonation, as affected by compression ratio and boosting, fuel becomes one of the most important factors influencing advance in these directions, and has been an obstacle to progress in England during the past few years.

It must be realised that fuel problems in England and Europe are of a somewhat different nature from those existing in America. We have no home product in England, with the exception of small experimental quantities, and all our fuels are imported. Our civil air lines, operating over many different countries, have to use a wide range of fuels, as standardisation is nothing like so easy a problem as in one large continent, such as America. Our Air Force has also to operate in many different countries, and our imperial position is an important factor which seriously affects the fuel question.

Little imagination is needed to realise that an engine running continuously at any considerable throttle opening, on a fuel which detonates, will encounter a whole series of troubles, which, if allowed to persist, may rapidly entail the total wreckage of the engine.

Until quite recently no country, with the exception of America, has taken this problem seriously and standardised a fuel of high octane number. America has standardised an 87 octane number fuel for military aircraft, for some time past, and, in April this year, issued a 92 octane specification.

A number of different types of liquid hydrocarbon fuels, suitable for electric ignition engines, are available, the principal being as follows:—

- (a) The straight run (or normally distilled) fuel.
- (b) Cracked fuels, which are produced by a high temperature process, which can be made to rearrange the hydrocarbon groups, giving higher anti-knock values than those obtainable from a straight-run spirit from the same crude.
- (c) Blended fuels, consisting of mixtures of straight-run spirits, or spirits to which benzol or other aromatics have been added, to give a higher knock rating.

* Abstract of paper read before the Royal Aeronautical Society on December 7, 1933.

Fig. 1. Bristol "Pegasus" Engine—Effect of Fuel Octane Values on Engine Performance

D.T.D. Specifica- tion	Minimum octane value.		Lead content for representa- tive fuel mls. of T.E.L. per imp. gall.	Relative power output				Fuel consumption	
	Determined according to A.M. spec.	Determined according to U.S.A. Army spec. Y.3557G		At normal r.p.m.		At maximum r.p.m.		Lbs./b.h.p./ hr. at normal power	Galls./hr. cruising at 400 b.h.p.
				B.h.p.	Lbs./B.h.p.	B.h.p.	Lbs./B.h.p.		
134	73	69	Nil	525	1.95	570	1.8	0.55	27.5
224	77	73	Nil	560	1.84	610	1.68	0.53	26.5
230	87	85	4	665	1.54	715	1.43	0.49	24.5
—	—	92	6	735	1.42	790	1.32	0.47	23.5

N.B.—Weights of these engines suitably adjusted for increased stresses.

(d) Hydrogenated fuels, in which the original hydrocarbons have been converted by a hydrogen treatment into compounds of higher knock rating.

(e) Alcohol fuels, which are of a very high knock rating, but the use of which is usually limited to racing, or other special events, where cost and high consumption, due to low calorific value of the fuel, are not factors of prime importance.

All these fuels are available in varying degrees in different parts of the world, although the hydrogenation process is as yet only in an experimental stage.

The characteristics of a straight-run fuel depend greatly on its origin, and thus the quality and type of fuel found in any part of the world will obviously depend on a number of factors, such as the type of crude base most readily available, transport facilities, magnitude of sales, etc.

The British Air Ministry have, in the past, standardised an aircraft fuel with octane number of 73, while 80 octane number has been available for military aircraft engines in certain European countries during the last year, and 70-73 octane number the average employed on civil air lines.

Fuel of 77 octane number has been standardised by the Air Ministry this autumn, and it is proposed to introduce a fuel of 87 octane number in 1934.

The necessary increase in octane value can be obtained, with a blended spirit, by the addition of a considerable percentage of aromatics, but the chief disadvantage of this combination is that its knock rating is seriously impaired by elevated temperatures. For all high-efficiency engines, and, in particular, air-cooled engines, this is a serious failing, and, undoubtedly, the most generally satisfactory combination is a straight run fuel of high naphthene content, and good lead susceptibility, with the addition of a small percentage of tetra-ethyl lead.

Such a fuel has other important advantages over a petrol-benzol mixture, as trouble can be expected with benzol mixture at high altitude, or in cold climates, owing to the high freezing point of benzol. Moreover, supplies of benzol would be unobtainable in the event of hostilities, as it would be required for the manufacture of explosives.

In this connection, I should like to stress the necessity of putting forward, for international

agreement, the method of determination of octane numbers, as considerable confusion exists at the moment, and different countries have adopted varying types of test engines and conditions in the standardisation of fuels.

With suitable engine modifications, the difference in B.M.E.P. obtained between an 87 and 73 octane fuel is of the order of 20 lb., and the increase of power obtainable from such an engine as the Bristol "Pegasus," using fuels of varying octane numbers, is shown in the tabulation in Fig. 1, together with the specific weight reduction and the comparative fuel consumption based on a cruising power of 400 brake horse-power.

I hope that in the above very elementary review of the possible hydrocarbon fuels available for electric ignition internal-combustion engines, I have emphasised sufficiently the great value of the lead taken by America in introducing a fuel of high octane value.

Such a fuel is of paramount importance, both for civil and military engines, and the necessity of solving the problem of its supply, on a commercial basis, cannot be too strongly emphasised. I do not consider that I am stating the matter too highly when I say that there is no question

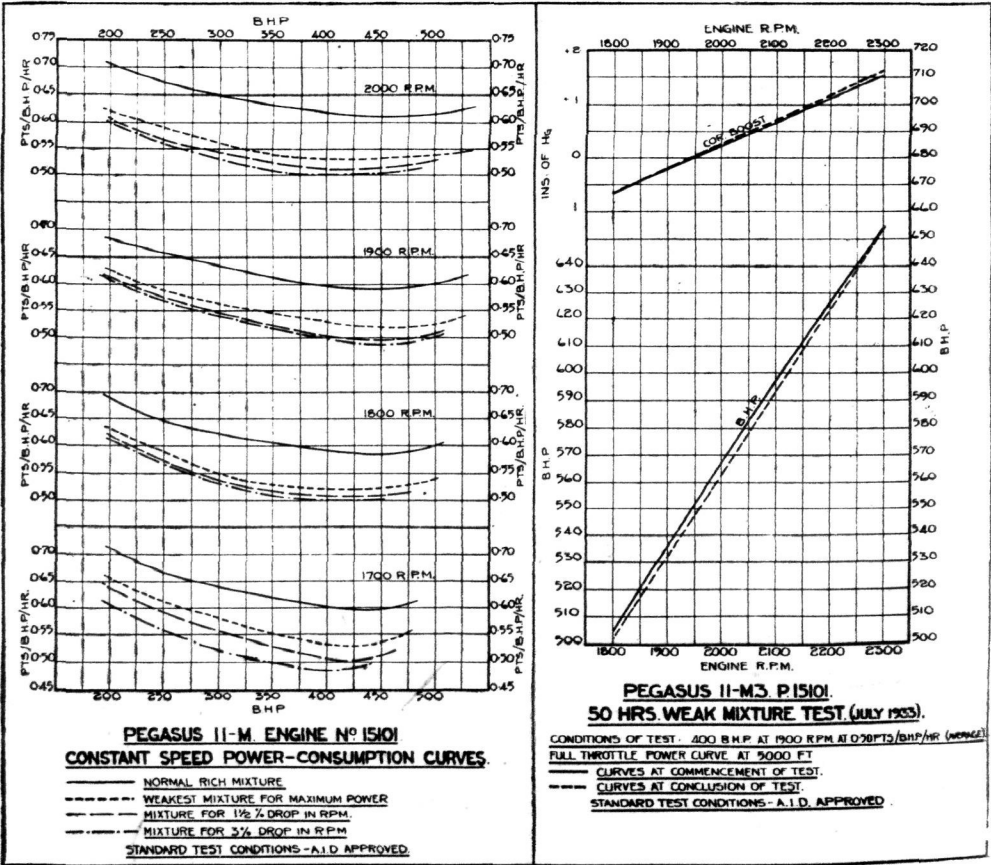


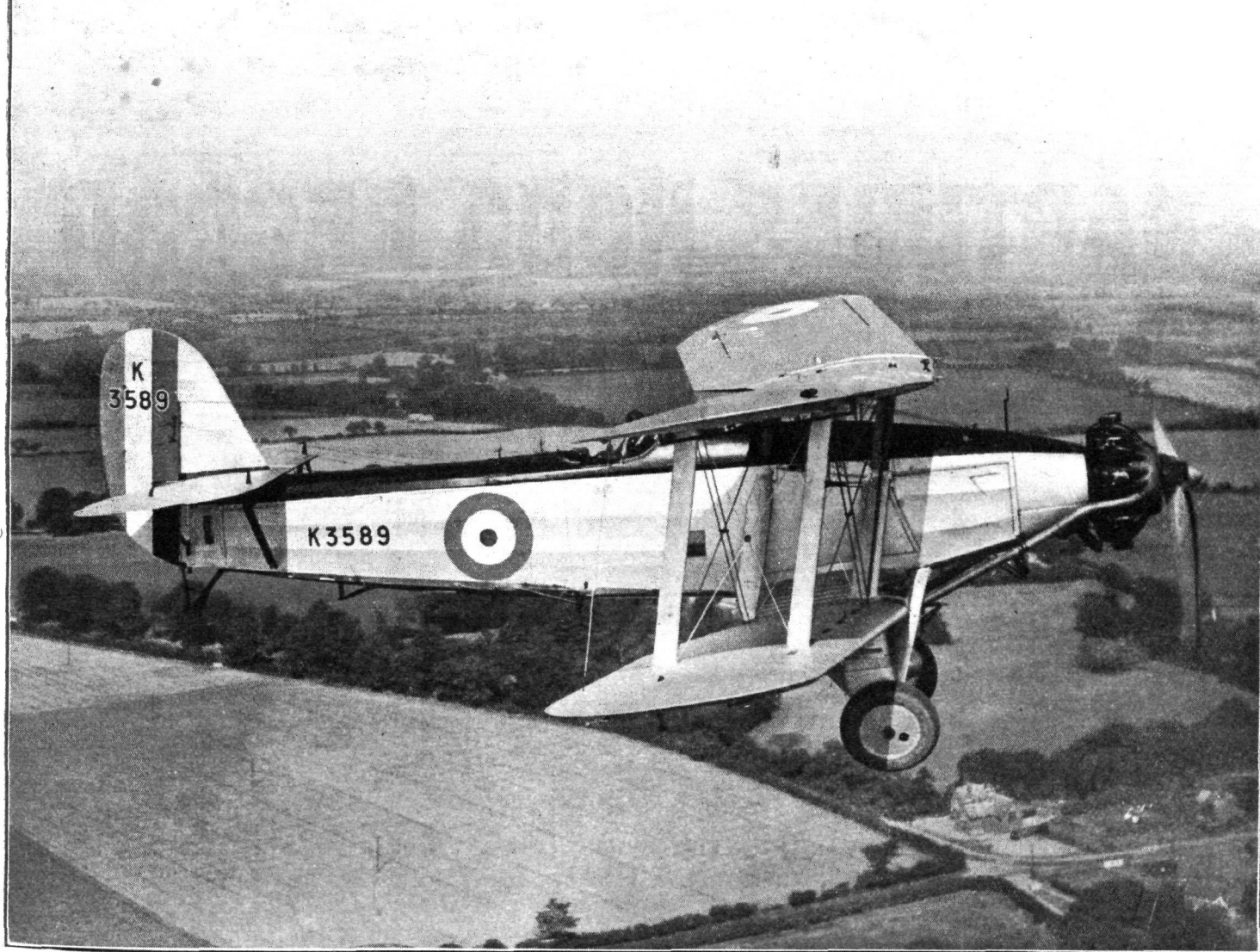
Fig. 2.

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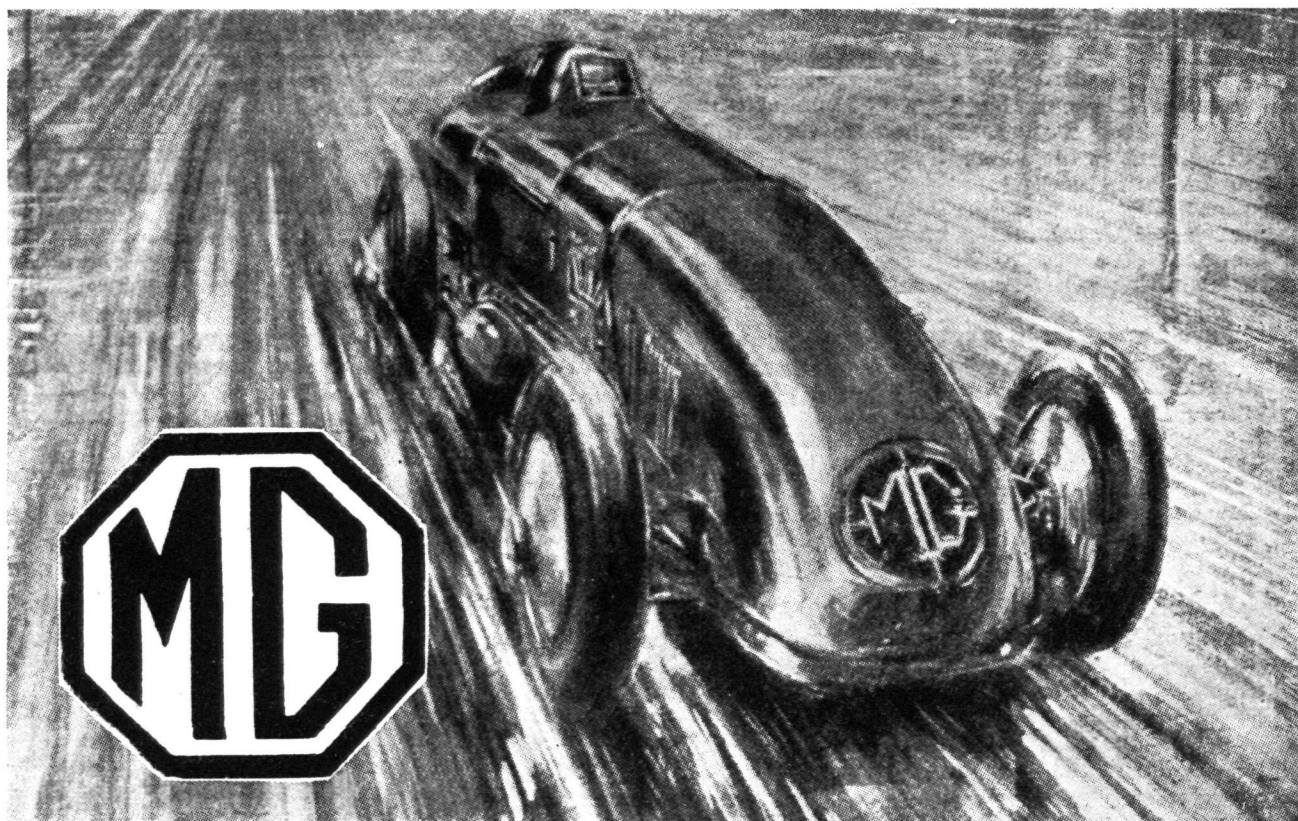
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of greater importance to engine development at the moment.

I believe the best solution for a high octane value fuel is by means of the addition of a reasonable quantity of tetra-ethyl lead, say, 4 c.c. per gallon. It would appear that it is not wise at the present time to exceed 4 c.c. per gallon, as available fuels show a poor lead consciousness with higher concentrations, and the actual engine problems are considerably increased.

The introduction, by the Air Ministry, of an 87 octane number fuel, referred to above, will be greatly appreciated by the air-cooled aero-engine designer, and will give scope for considerable development on military engines, and it is hoped that fuels of not less than 80 octane number will, at the same time, be available for civil air lines.

The use of tetra-ethyl lead introduces a number of problems not encountered with normal fuels, including corrosion of valves, valve seats, cylinders, etc., and recent developments have shown the wisdom of the Air Ministry in limiting the lead content to 4 c.c. per gallon in the new specification.

A considerable amount of experimental work has been going on to overcome the deleterious effects of lead, and I will refer to this matter in more detail later on in the paper. The question of the internal corrosion of engines, using high lead content, after standing for long periods, or in stores, and the harmful effects on exhaust systems, are also problems which require attention.

While the higher octane number specifications referred to are a "step in the right direction," and will show considerable improvement in engine output, I would emphasise the necessity of immediately making preparations so that the octane number may be further raised at a future date, in order that the development of the air-cooled aero engine which is possible, within the period under review, may be realised.

Considerably more attention must be paid to the importance of fuel consumption on air-cooled engines, and, apart from the standard type approval tests, Bristol engines have recently been subjected to a 50 hours' cruising consumption

test, in order to establish the minimum consumptions which are allowable.

Fig. 2 shows the figures attained on a recent consumption test with the Bristol "Pegasus" M. engine.

The figures are in no way the ultimate to be aimed at, but are quoted as showing that the consumptions of air-cooled engines are capable of treatment, and it is believed that by development along suitable lines, a considerable further improvement can be made, from the point of view of fuel economy with the compression ratio as high, and the boost as low, as is feasible.

Supercharging

Supercharging briefly consists of increasing the density of the charge by means of an external compressor, and is one of the most outstanding developments of the modern aircraft engine.

The principle of supercharging aircraft engines has been applied with two objects in view. Firstly, the maintenance of ground level induction-pipe pressures and powers, at high altitude, and the other—the increase of ground level power over and above that which is possible by natural aspiration: this latter form of supercharging is commonly known as ground boosting.

On the earlier supercharged engines it was considered permissible, by certain engine constructors, to compensate for rather inadequate breathing organs by ground boosting, and a number of engines have been put into production, in which the valves and porting system have been on the small side, thus easing design and production, and it has been hoped by this means to obtain good efficiency. The experimental work of the Bristol Company has conclusively proved that this is bad practice. To obtain satisfactory and efficient supercharging, the engine must start off with the freest and most efficient breathing functions possible, as restricting the valve and port areas, and then supercharging, only leads to a series of difficulties, and the aim should be to obtain the maximum power at rated altitude with the minimum positive boost.

It is interesting to note that the latest examples of

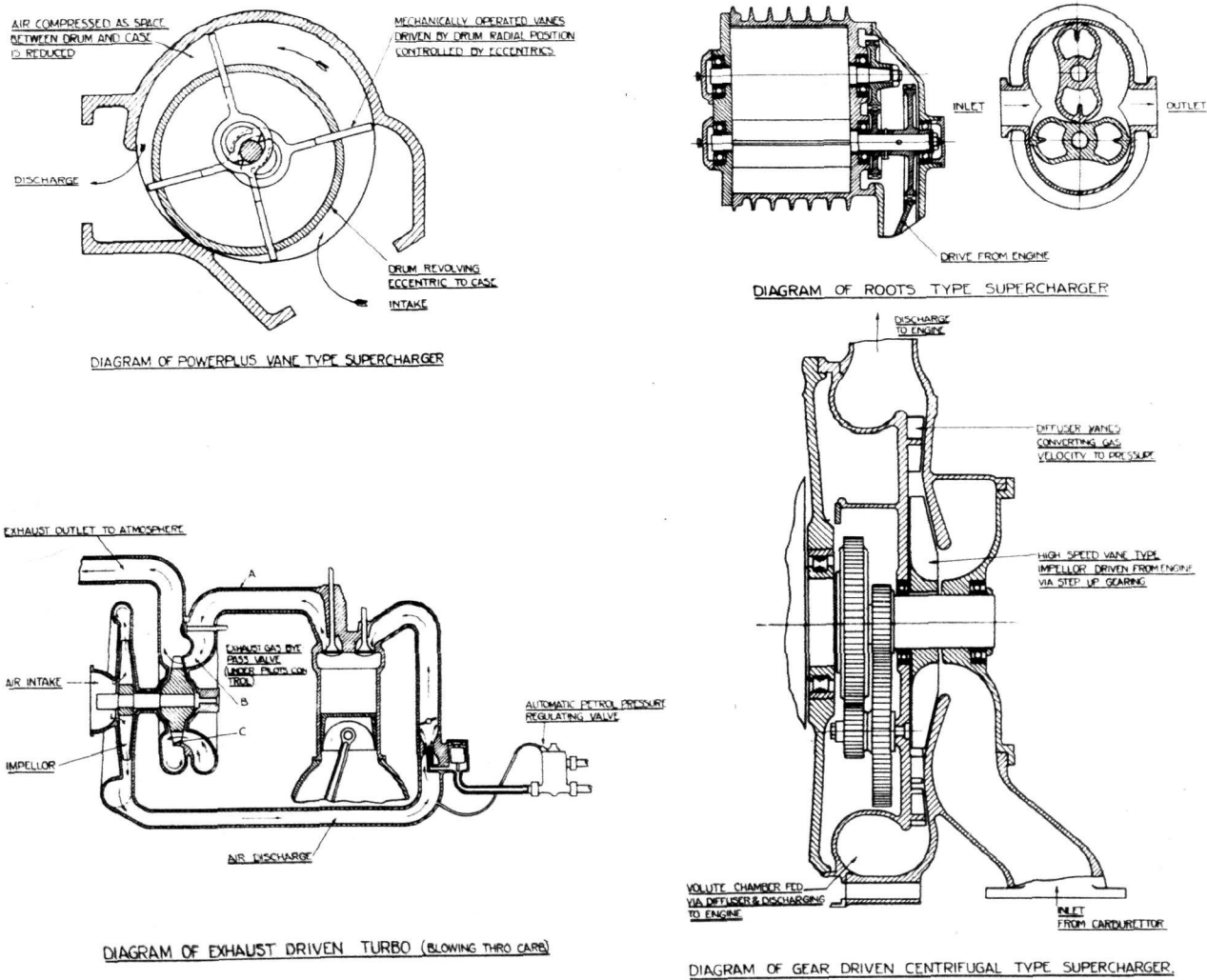


Fig. 3 : Representative types of Supercharger.

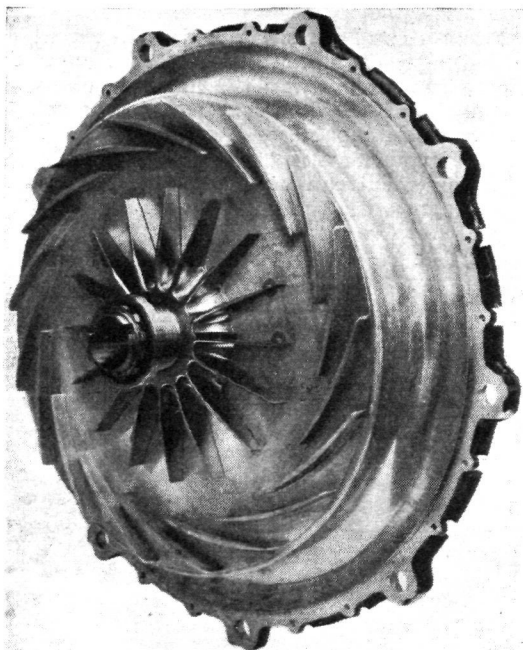


Fig. 4: A "Bristol" supercharger unit.

American engines are now employing the largest possible valves and port areas for supercharged engines.

With a supercharged engine, for a given increment in horse-power, the advance in explosion pressure is not so great as that obtained by increasing the compression ratio, but the cylinder and exhaust gas temperatures are considerably higher, so that cooling difficulties are greatly intensified, and fuel consumption is adversely affected, while the extent to which intake pressures may be increased is again limited by detonation, although the use of an intercooler raises the permissible limit.

A considerable amount of research work has been carried out on the design of superchargers for aircraft engine. To attempt to review in detail the work which has been achieved is beyond the scope of this paper; it is sufficient to say, however, that, up to the present time, superchargers for aircraft engines have been mainly confined to three types—the mechanically-driven centrifugal fan, the exhaust-driven turbo compressor, and the direct displacement blower, chiefly of the Roots type. Fig. 3 shows these types in diagrammatic form. By far the greatest number of aircraft engines to-day employ the mechanically-driven centrifugal fan type, for the reason that it has been found to be the easiest, the lightest, and the most compact form to adopt, taking into consideration the comparatively limited speed range of an aircraft engine. There is little to choose between the efficiencies of these types, and, at the moment, it is difficult to envisage any marked improvements in this direction.

Fig. 4 shows the centrifugal type of supercharger as applied to the present series of Bristol engines.

Fig. 5 shows the Alfa-Romeo "D" type radial engine, with the Roots type of displacement blower built into the rear of the crankcase.

It is interesting to note that the engines fitted with the two blowers just illustrated—the Bristol centrifugal fan type and the Alfa-Romeo displacement type—were taken to the Stelvio Pass in the Alps, in the summer of 1932, mounted on special portable test benches, and calibrated under actual altitude conditions of 9,000 ft., a full analysis being made into the relative efficiencies of the two types of blower. This proved to be an interesting test, and is, I believe, the first time that such a comparison has ever been made in Europe.

Fig. 6 shows the Bristol "Mercury" engine actually on test on the Stelvio Pass, in July, 1932. (Not published.—Ed.)

An investigation of the analysis of the comparative efficiency of the two blowers, powers, fuel consumption, etc., showed that while both engines were slightly down on their estimated powers, the Bristol centrifugal fan type very nearly approached the altitude rating as determined by the conditions imposed by Air Ministry Publication 840—Schedule of Standard Type and Production Tests for Aircraft Engines.

The Bristol Company have recently completed an

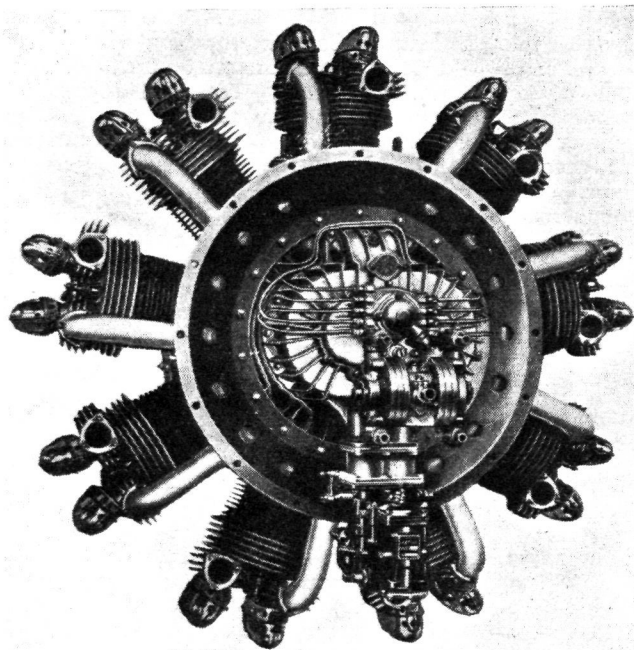


Fig. 5: An Alfa-Romeo "D" type radial engine.

exhaustive research for the British Air Ministry on geared centrifugal type superchargers, covering some fifteen months' work, and including an investigation into different types, diameters and clearances of impellers and diffusers, impeller bearings, etc., from which we have been able to obtain a fair idea of the possibilities of this type of blower, and the detail improvements that may be expected.

Where it is necessary to maintain reasonable power for take-off and climb, it is not thought possible to use a single-stage blower of centrifugal type with a compression ratio of more than 1.85 to 1 (giving a rated altitude of 15,000 ft.), owing to the power losses in the blower when running throttled on the ground, and the limitations entailed by cylinder compression ratio and fuel available.

As regards the exhaust turbo compressor, the Bristol Company produced the first British air-cooled radial engine to fly, embodying this principle, in 1923. Since that date, two or three other applications of this system have been made by engine makers in England. In my opinion, owing to certain difficulties in the original layout and the materials used, the exhaust turbo compressor has been unduly condemned, and I think we shall hear more of this type at a future date.

Owing to the fact that it is possible to bye-pass excess mixture at low altitudes, with the Roots type of blower, and, therefore, minimise the power taken to drive the blower, it has been suggested that this would make an attractive unit for the radial air-cooled engine, and that it should be possible to maintain rated boost to 20,000 ft. and still obtain reasonable take-off power.

While it is possible that the Roots type of blower may be introduced on in-line engines, its shape and dimensions are such that it can only be incorporated on a large static radial with difficulty, and at the expense of a considerable increase in bulk and weight.

What developments may we expect to the supercharger, during the period under review?

(a) I suggest that we shall see some form of compressor standardised on every aircraft engine, following out directly the trend of thought of increased output from a given swept volume.

(b) When it becomes necessary to restore the ground level power of aircraft engines, at a greater altitude than has been accomplished at present, approximately 15,000 ft., still maintaining reasonable take-off power, I suggest the two-speed centrifugal blower offers the most practical solution, and I think there is no doubt that we shall see considerable development in this direction during the next few years. It is debatable if the weight and the complication of the two-speed blower are justified unless the rated altitude is raised in excess of 15,000 ft., in which case inter-coolers will be required. Such inter-coolers must not be excessively heavy or bulky, nor of high drag, and their design is a problem which will demand considerable ingenuity for incorporation in in-line or radial type engines.

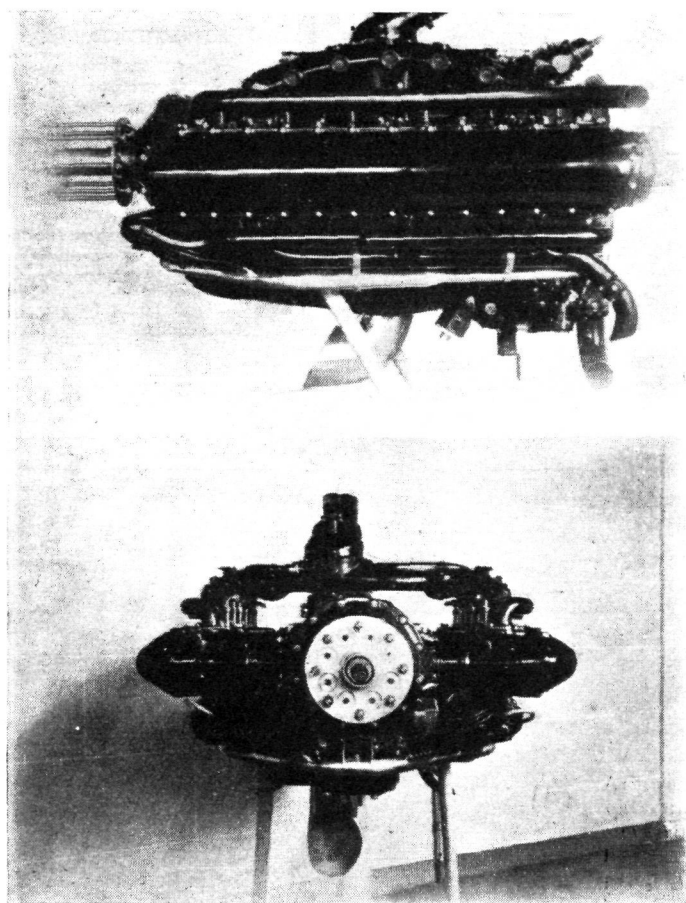


Fig. 7 : Two views of Potez horizontally-opposed engine.

(c) If the demand for restoration of power at still higher altitudes becomes insistent, I incline to the view that there may be a reversion to the exhaust turbo compressor, as this scheme, in somewhat modified form, offers many advantages.

An interesting engine appeared at the Paris Salon of last December, incorporating some of these modifications, and Fig. 7 shows two views of the 12-cylinder horizontally opposed Potez engine. This is the first concrete attempt to interpret the late Mr. Rateau's final views of the exhaust turbo system, to avoid the disadvantages met with in the earlier types.

The cycle of operations is as follows:—

- (i) After explosion, the first exhaust valve, which is connected to the turbo charger, opens, and the initial blast of hot exhaust gas drives the turbo compressor.
- (ii) At the end of the firing stroke, the second exhaust valve begins to open, in order to permit an uninterrupted exhaust; thus the engine is not required to function under any back pressure.
- (iii) Both exhaust valves close at the end of the exhaust stroke and one inlet valve opens, admitting pure air from one-half of the blower.
- (iv) Towards the end of the induction stroke, the second inlet valve opens, to admit very rich mixture, which is supplied from the second half of the blower, in conjunction with a single choke Zenith carburettor for each bank.
- (d) A demand for greater increase in the restoration of power at altitude will increase the problem of engine cooling, which I am dealing with under a separate heading.

Engine Cooling

As I have endeavoured to outline in this paper, both supercharging and increasing engine speed entail the dissipation of more heat in a given time, and, therefore, if the air-cooled engine is to maintain its position, cooling technique must be developed.

The cooling problems connected with direct air-cooled aero engines cover such a wide scope that it is impossible to deal with the main headings more than briefly in this paper, as follows:—

- (1) The prevailing conditions under which direct air-cooled engines usually operate.

- (2) The detail design of flight-induced air-cooled cylinders.
- (3) The ring cowling of radial air-cooled engines.
- (4) The fan cooling of air-cooled engines.

Referring to heading (1)—the prevailing conditions under which direct air-cooled engines usually operate—I suggest that it is necessary to endeavour to visualise the aircraft, as far as possible as a whole, if the best results are to be obtained, and that the laying of too much emphasis on engine cooling, or certain aspects of the aircraft, will not make for the most satisfactory combination. At the present time it is standard practice for British military aircraft to climb at a considerably steeper angle and lower air speed than is the case in certain other countries, and, while I do not propose to criticise this practice, it will be appreciated that it throws a considerably more arduous duty on the cooling of the engine, and there is no doubt that many direct air-cooled engines, which would function quite satisfactorily in certain foreign aircraft, would give serious trouble, in a short period of time, in our military service, and it must be obvious that an engine which will operate at a climbing speed of 140 m.p.h. with open exhaust is quite inadequately cooled at a climbing speed of 95 to 100 m.p.h. with a complete exhaust system.

In a similar way, for a number of undoubtedly perfectly good reasons, upon which I do not propose to dilate or criticise in this paper, the shape of the fuselage immediately behind the air-cooled engine is sometimes very disadvantageous from the point of view of the best cooling.

Turning to heading (2)—the detail design of flight induced air-cooled cylinders—the cooling surface of any engine must dissipate a quantity of heat equivalent to approximately 60 per cent. of the brake horse-power. In the case of the flight induced air-cooled engine, the ability to cool is dependent upon the fin area required to effect this rate of heat dissipation, the detail design of the cylinders, and the installation conditions.

Until recently, six square inches of cooling surface per cubic inch of cylinder volume was considered normal practice, but at the present time 11 to 12 square inches are employed on the most up-to-date geared and supercharged engines. During this period under review, the introduction of higher output and considerably higher rotational speed will entail, I suggest, an approach to 15 to 20 square inches per cubic inch of cylinder volume.

With the increased compression ratio and high boost used with high octane fuels, resulting in greatly increased specific power output, it seems necessary to ensure that the whole combustion chamber is made as free as possible from any local points which may overheat and cause detonation.

With the higher duty engines, it is of the utmost importance that cylinder temperatures should be observed whilst running, as this provides a most ready means for telling whether the engine is working satisfactorily, and that detonation is not being caused through any reason such as inferior fuel. The Bristol Company have long advocated the use of a pyrometer system on air-cooled engines, as the air-cooled engine is long suffering and has no immediate way of making its complaint known such as exists in the boiling of the cooling water of a water-cooled engine. With air-cooled engines of high output it is considered more essential than ever to standardise some form of cylinder temperature measuring equipment.

It has been suggested that a compromise of air-cooled barrels and permanently sealed Prestone-cooled heads might prove a possible solution, and, although I must confess to having gone so far as setting down such schemes on paper, my present view is to adhere definitely to the direct air-cooled engine.

The Bristol Company have been fully alive to the necessity of development of cowled installations with flight induced cooling to meet the arduous conditions of British military aircraft already outlined, and a considerable amount of interesting data were obtained in connection with cooling problems during the experimental flight tests made by Mr. Uwins when preparing for the World's Altitude Record in the autumn of 1932; and, at altitudes of 40,000 ft. and over, it was found that cooling and cowling technique were matters of the utmost importance.

With this end in view, the Bristol Engine Research Department has concentrated on this problem during the past three years, carrying out a series of experiments comprising some thousands of hours' full throttle running, and including a series of breakdown tests carried out under abnormally low wind speed and high-temperature conditions.

As it was impossible to obtain the necessary high temperatures under the standard full throttle test conditions, a special breakdown test bed was initiated by the Bristol Company, in which the cooling wind speed was reduced to 60 miles an hour, and a baffle board was arranged at the rear of the cylinder in order to obstruct the get-away of the cooling air, the unit being run continuously at full throttle (2,100 r.p.m.), corresponding to a main engine power output of 600 brake horse-power. Standard fuel to Air Ministry D.T.D. 134 specification, 73 octane (68 octane number by C.F.R. motor method) was used, and the fuel consumption limited to 0.58 pts./brake horse-power/ hr. throughout.

Under these conditions the "Jupiter" type cylinder failed after 60 hours, and, as a duration of at least 100 hours was the standard set to ensure satisfactory life under service conditions, it was evident that the cylinder design would need careful consideration in order to make the cooling capacity satisfactory for use with ring cowl.

In the course of the series of experiments carried out during the evolution of a cylinder capable of coping with these conditions, twelve different types were designed and tested before the present "Pegasus" cylinder was evolved. It was found possible, with the lower wind speeds, to reduce the pitch of the cooling fins by 50 per cent. without loss of cooling efficiency, and, by this means, together with an extension of the finned surface, the total cooling area was increased by 66 per cent. With this cylinder the temperatures obtained, under the original breakdown test conditions, were so low that the test would have failed in its object, and it was considered desirable to increase its severity. The wind speed was, therefore, further reduced to 40 miles per hour, the lowest operating speed obtainable with the plant.

Despite the lowering of the wind speed by 30 per cent. below the "Jupiter" type cylinder test conditions, the "Pegasus" cylinder tests showed a drop of the order of 10 per cent. in the cylinder and exhaust valve temperature. Under these abnormal conditions the 100 hours test was completed with entire satisfaction, the performance being well maintained, and, at the conclusion, the cylinder, valves and seats were in first-class condition; the unit being retained for further high-duty test running. Since the clearance of the cylinder, it has been run continuously for long periods under heavy duty on the single-cylinder test bench with complete success and without any sign of breakdown or failure. To date, approximately 700 hours have been completed, a final check test made comprising over 300 hours' running at 2,200 revolutions per minute, with a normal climbing speed of 90 miles per hour. Under these conditions 150 hours were run at a brake mean effective pressure corresponding to the engine rating, followed by another 150 hours at 10 per cent. increase in brake mean effective pressure, and a final 20 hours' run at 30 per cent. in excess of the rated brake mean effective pressure.

Fig. 8 shows side and plan views of the latest "Pegasus" cylinder as compared with the "Jupiter" cylinder, the former type having shown itself capable of running satisfactorily under low wind speed and full throttle test conditions for such long periods that it is considered satisfactory for the life of the engine under all reasonable cowl conditions.

Such results have been made possible only by the forged-head design of cylinder, on which, with modern machining methods, the increased cooling area has been obtained by

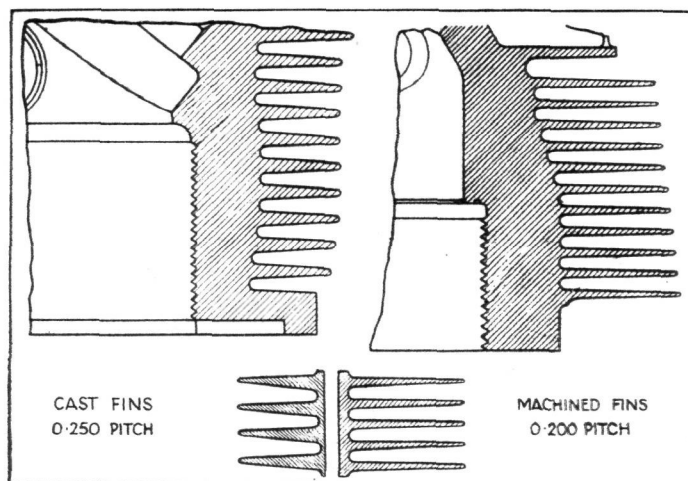


Fig 9 : Relative air passages with cast and machined fins.

close-pitched deep but efficient finning, which it would be impossible to produce by any form of sand or die casting. Fig. 9 illustrates the advantage of machined fins.

Whereas it is realised that the all-machined cylinder does not give one the same scope of change in design, it is quite a wrong impression to consider it a more costly job. Actually the Bristol Company are producing their forged heads at a lower cost than the cast ones, and there is no doubt that the forged head offers accurate precision methods for producing consistent air-cooled heads in large quantities, which cannot be approached when the head is in cast form.

Turning now to heading (3)—the ring cowl of radial air-cooled engines—I do not propose to attempt to touch on the aerodynamic problems, but only to endeavour to explain a few of the difficulties from the engine-cooling aspect. At the outset it may be desirable to state that the increase in cooling problems caused by ring cowl has been checked under full-scale conditions by the Bristol Company, through the courtesy of the Vickers Company, who loaned their wind tunnel for investigating a "Pegasus" engine in front of a streamlined body with various types of ring cowl. Fig. 10* shows the different aspects of these tests, and, although it was not possible to obtain accurate drag figures with the different types of ring cowl tested out, the flight results were entirely confirmed, the air speed over the cylinders being reduced to 75 per cent. when ring cowl was fitted to the engine, as compared with the figure obtained with a bare engine in front of a streamlined body.

The Bristol Company standardise four types of ring cowl for military aircraft, as shown in Fig. 11, viz.: Small-diameter forward exhaust ring and plate ring cowl; rear exhaust ring combined with plate cowl; Boulton & Paul polygonal combined exhaust ring and plate cowl, and Bristol large-diameter front exhaust ring combined with plate cowl.

On American installations, long chord N.A.C.A. cowls are, I understand, supplanting the shorter type on single-row radials, and also on some of the new double-row engines, with success, and when using gearing and super-

* (Not published.—ED.)

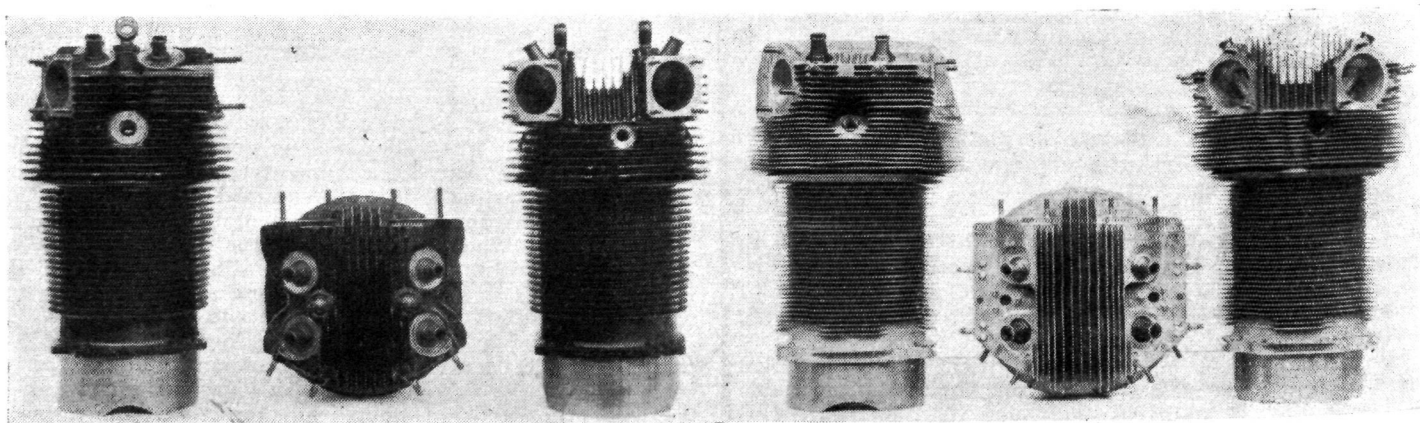
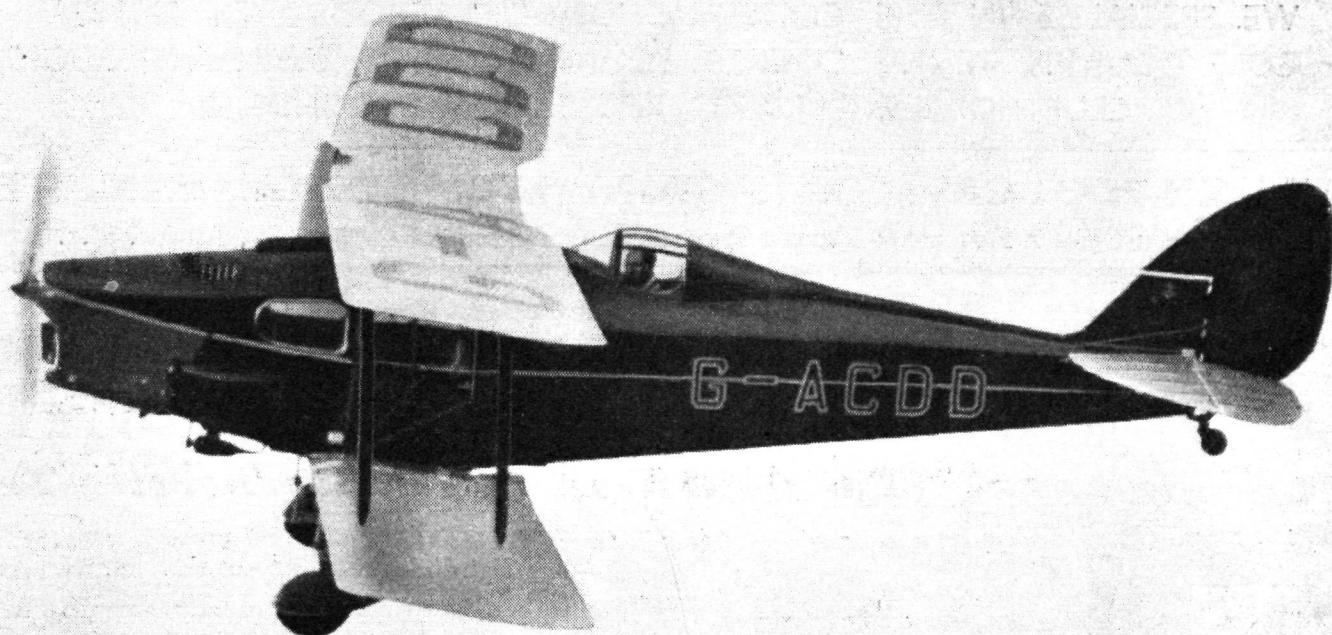


Fig. 8 : On left, a "Jupiter" "F"-type cylinder, and on the right the cylinder of a "Pegasus."

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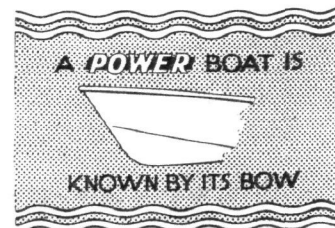
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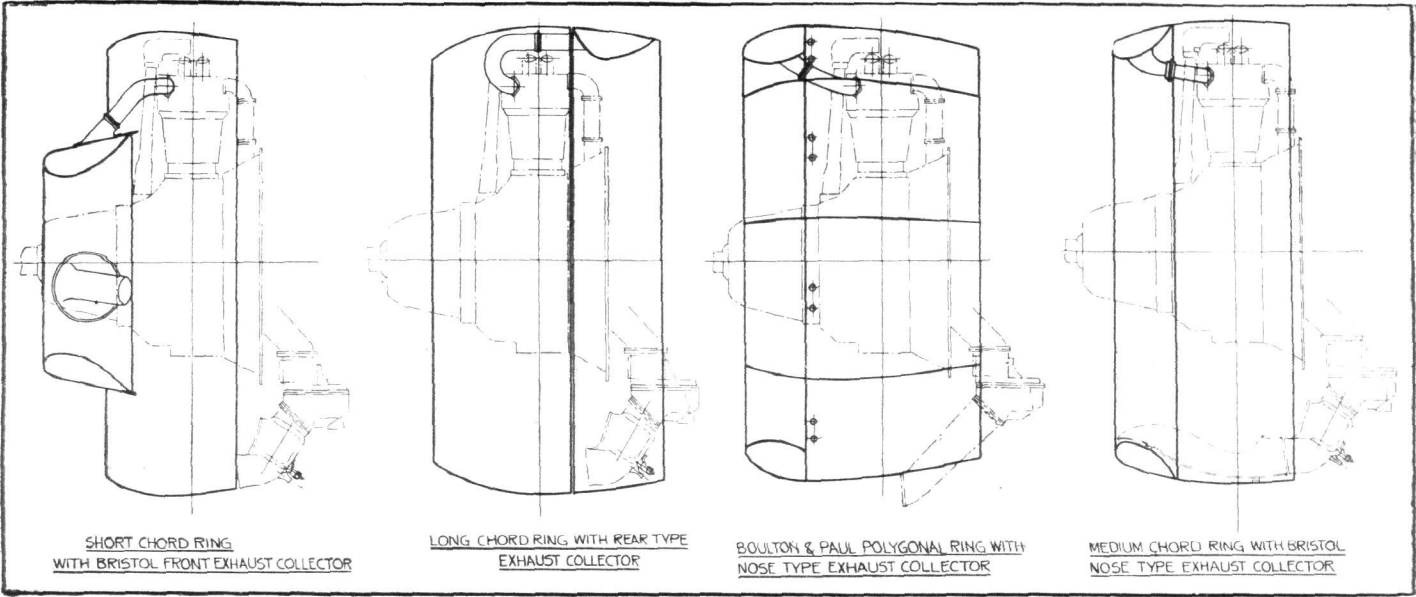


Fig. 11 : Application of Boulton & Paul Townsend rings to Bristol engines.

charging, but with higher climbing speed and higher cylinder temperatures than are permitted on British military aircraft.

With the introduction of fuels of higher octane number, I suggest that we may be able to approach more nearly the cylinder temperatures which are permitted with these American cowlings. These N.A.C.A. cowlings have a smaller inlet than is standard on the Townsend rings used on British aircraft, the bodies immediately behind the cowlings are very carefully shaped to the correct contour, and great attention is paid to appropriate proportioning of the annular space of the outlet. The cylinders are fully baffled, and a comparatively smaller volume of air scrubs the cylinders more effectively, with a consequent lowering of the drag over the body of the aircraft. Although it may be impossible to employ this type of cowling on British single-engined aircraft, I see no reason why this type of installation should not be applied with satisfactory

results on multi-engined installations. Fig. 12 shows the latest type of American N.A.C.A. cowling as applied to the "Cyclone" geared and supercharged engine. The question of accessibility, weight and robustness of cowling for radial air-cooled engines is a point upon which some attention is required, and I suggest that an important development along this line is for the engine maker to standardise the complete equipment.

With regard to heading (4)—the fan cooling of air-cooled engines—it is quite conceivable that the ultimate solution of the cooling problem will lie in the permanent enclosure of the air-cooled engine in a suitable duct, and cooling it by an engine-driven fan. Up to the present time such a scheme has not made headway, chiefly, I believe, because it entails a specialised form of aeroplane fuselage for its suitable installation.

(To be continued.)

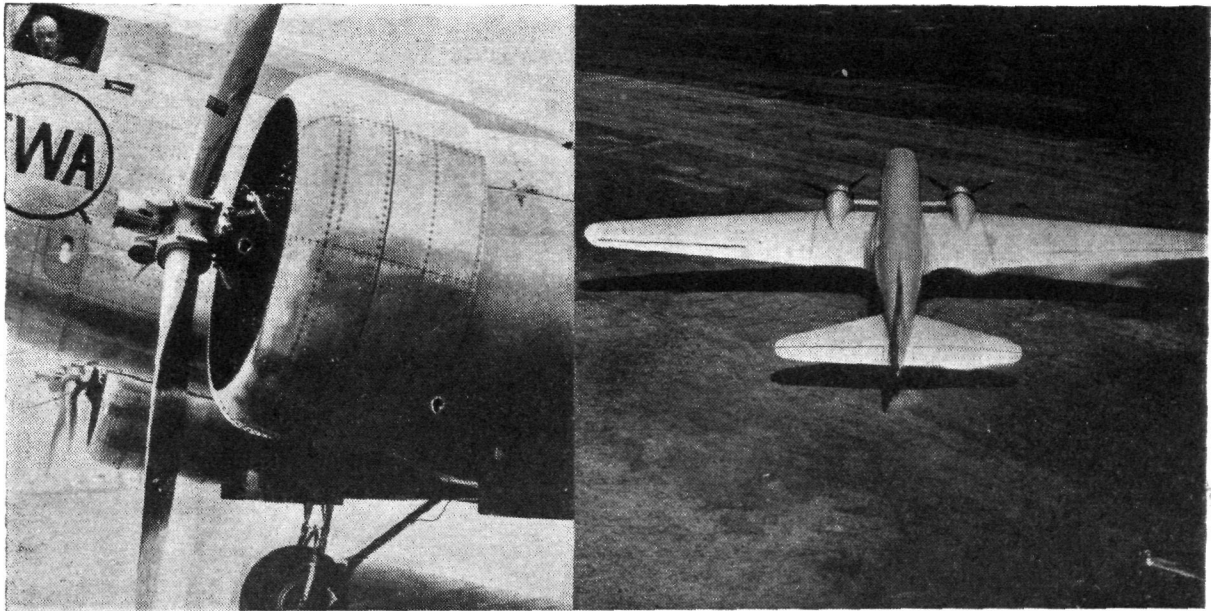


Fig. 12 : The Douglas "Airliner" with latest N.A.C.A. cowling for "Cyclone" geared and supercharged engines.

An Irish reserve force

I LEARN on good authority, writes our Dublin correspondent, that the government of the Irish Free State is contemplating the setting up of a new reserve to the Army Air Corps. The scheme under consideration involves, it is understood, co-operation with one of the two clubs in the Free State, and a bounty would be paid for each pilot

trained for the reserve. It will be recalled that about two years ago the Free State Department of Defence set up a scheme to train specially selected members of the Officers' Training Corps as pilots under the tuition of the regular Army Air Corps instructors, but for some reason the scheme was not proceeded with, although six machines were purchased for the work.

FROM THE CLUBS

THE LONDON AEROPLANE CLUB

Flying hours for the week totalled 30 hr. 30 min. Among new members the Club has pleasure in welcoming Mr. P. H. B. Sprosen. The new "Gipsy Major" wooden "Moth" arrived on Saturday, December 9, and has an exceptionally fine performance. Members are asked to take tickets for the Christmas Turkey Lunch, on Sunday, December 17, as soon as possible.

HANWORTH (N.F.S.)

An Old Year "Whoopie" dance will be held at the clubhouse on Saturday, December 30; dinner will be held before the dance, and applications for tables should be made to the Club Secretary. The Club will be open throughout Christmas.

HERTS AND ESSEX AEROPLANE CLUB

The December monthly competition was held on Sunday, December 10, over a course which spread over the county of Essex. Considering that only one minute was allowed in which to study the map and work out the course, remarkably good flying time was maintained throughout, and all competitors returned safely. The winner was Mr. W. F. Dack, who gained 100 per cent. marks, Mr. W. J. Alington being second with 95 per cent. marks. The cups, presented by the Club, were presented provisionally. Mr. R. Williams did his first solo after just over 8 hr. dual; he is now carrying on for an "A" licence. The week's flying totalled 40 hr., 25 of them being solo. The Club will be closed on Christmas Day, and on Boxing Day a treasure hunt and party will be held.

LEICESTERSHIRE AERO CLUB

Fog and rain reduced the flying times for the month to 28 hr. 45 min. Eight machines visited Desford and eight machines did cross-country flights to five aerodromes. A firework party was held on November 4 and a very successful dance at the Leicestershire Palaise-de-Danse on December 1. "A" licences had been gained by Messrs. R. K. Potter, F. Salmon and L. Lillingston, M.F.H.

CARDIFF AEROPLANE CLUB

The flying times for the week ending Sunday, December 10, totalled 4 hr. 15 min. dual, 2 hr. 50 min. solo and 25 min. test. One new associate member joined, F/O. W. J. Hickey.

READING AERO CLUB

Mr. Stephen Cliff started off for Cairo on Monday, December 4, flying his "Gipsy III Hawk," and by Wednesday evening had reached Naples—later he was reported to be in Tunis—his average speed being 123 m.p.h. Another "Hawk" of a very businesslike appearance is nearing completion in the workshops, and bears Indian registration letters; it is for Mr. Singh. The engine is a "Hermes IV," and the machine has sufficient tanks to give it a range of 2,000 miles. The work of the School has been somewhat hampered by high winds, but a Miles "Martlet" which has recently been acquired is proving very popular. Mrs. Battye, in her capacity of personal pilot to Comdt. Mary Allen, Chief of the Women's Police Force, is making her first official flight to Bristol next week. Mr. Ruddle and his navigator are starting on their Continental tour early next week. The Club congratulate

Mr. Worger Slade on successfully passing his night-flying and final test for a "B" licence; he has waited quite a long time for suitable weather, and his patience has at last been rewarded. Mr. Lehmann, a German pupil, has completed his first solo cross-country flight. A special Christmas dance will be held on Saturday, December 16.

THE YORKSHIRE AEROPLANE CLUB

About 9 hr. were flown on Club machines at Yeadon during the week. There was one new member, Mr. G. A. Masson, from Halifax.

BROOKLANDS

Bad weather during the week curtailed flying, and on the three available days 30 hr. dual and 25 hr. solo was recorded. New members are Messrs. R. Williams, C. Wrench, B. Murphy, S. Harris, E. Fenn, J. Collins, H. Plumridge, A. Rayender and Murrnan. Owing to the increased membership, the Club has purchased another "Moth" for instructional purposes—it is a metal one. Cross-country flights were carried out to Hamble, Tangmere and Salisbury. Flt. Lt. E. J. Dease has completed his instructor's course and has been passed out for his Guild Certificate. Capt. Davis and Capt. Findlay have returned from their trip to Mallorca; it was apparently successful both in business and pleasure. Capt. Findlay, at the last dance, was presented with a silver cigarette casket and two silver ash trays, in appreciation of what he has done for the Club during his four years as chief instructor. Two machines have been sold, one to Com. Fitzmaurice and one to Sir R. Hare. There is at the present time quite a large selection of second-hand aircraft for sale at Brooklands. The Brooklands Aero Club are holding a "Tramps" party on Saturday, December 16, and it is hoped there will be the usual large attendance. Christmas cards are now available and can be obtained from the Brooklands Flying Club.

GRAVESEND

The good weather conditions and fine geographical position of Gravesend Airport were again demonstrated during the week. On Wednesday and Thursday, when Croydon and a great many other aerodromes were suffering from bad visibility, machines were able to land at Gravesend. The first machine to land was a K.L.M. Customs and a coach were ready, and within ten minutes of landing the passengers were on their way to London. In all cases passengers, mail and freight were quickly sent by road. One machine bound for Rotterdam had to land at Lympne to clear Customs in spite of the fact that Customs officials were actually in attendance at Gravesend. The next day, however, consent was given for Customs for outgoing machines to be cleared at Gravesend.

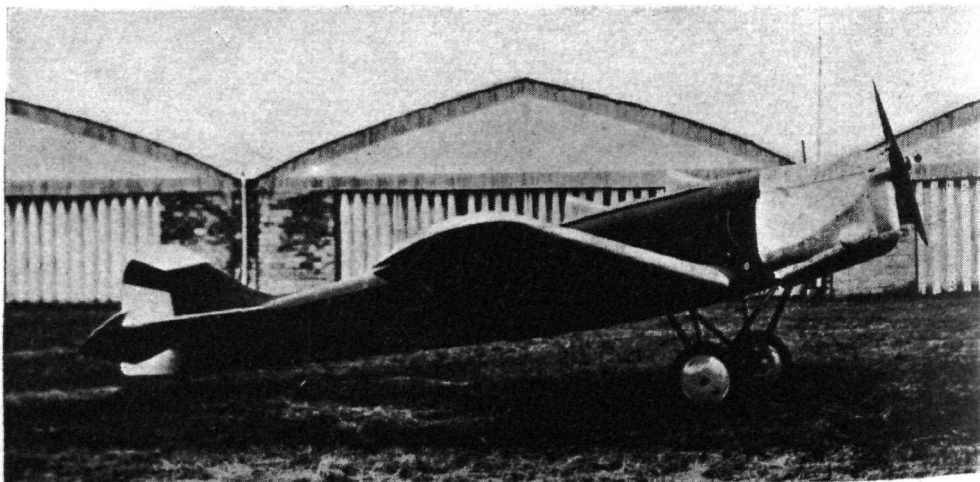
LIVERPOOL AND DISTRICT AERO CLUB

The weather and visibility have been exceptionally bad during the week, and only 8 hr. 15 min. dual and 15 hr. 45 min. solo were flown.

SOUTHEND FLYING CLUB

Both the "Moth" and "Bluebird" have been kept busy during the week on instructional and solo flying. Messrs. Deavin and Garland have passed tests for "A" licences; Mr. Garvin is a war-time pilot and was once an

A BELGIAN TOURING PLANE :
The Saint-Hubert 135 B.O. low-wing monoplane, constructed by the Saint-Hubert Aircraft Engineering Works and designed by Mr. Pierre Baudoux (of Brussels University) and Mr. J. Orta, of the Saint-Hubert Aerodrome. It is equipped with a "Cirrus-Hermes IV" engine, and has a maximum speed of 152 m.p.h. and a cruising speed of 127 m.p.h.



instructor on "Camels" at the old Government aerodrome at Rochford. Mr. Ballard, having done a successful first solo, is making progress towards a licence.

HULL AERO CLUB (N.F.S.)

The Club is aiming to make Boxing Day a success both flying and socially. There will be a competition which will include balloon bursting, the bombing of a car, aerobatics and a landing competition. Competitors will do the four events in one flight. In the evening there will be a novelty dance with prizes; the Imperial Orchestra will be in attendance. Tickets for lunch can be obtained beforehand from the Steward for 2s.; those without tickets will be charged 2s. 6d. admittance. Charge for the dance is also 2s. As December 31 falls on a Sunday this year, the New Year's Eve dance will be held on the Saturday. The annual general meeting will take place about the middle of January.

JOHANNESBURG AERONAUTICAL ASSOCIATION

Johannesburg Light Plane Club, now known as the Johannesburg Aeronautical Association, was founded by Mr. Rod. Douglas about six years ago at Baragwanath aerodrome. It claims to be one of the few flying clubs that has held its own under conditions which have forced other clubs to liquidate. Beginning its life with one machine, a "Cirrus Moth," and one instructor, it now possesses four aircraft, a "Puss Moth," two "Gipsy I Moths" and a "Gipsy II Moth," numerous other machines were also at its disposal, including a D.H. "Dragon" and a "Fox Moth." After the Club's first year of operation the membership stood at 196, which has since been increased to nearly 500. The original accommodation consisted of one tent hangar and another tent which served the purpose of club-house; now there is a reed-covered club-house and outside office for the staff of two instructors and secretary. During the Club's existence 120 pupils have been trained to fly, of whom over 80 have received "A" licences and 12 "B" licences; among these are many pilots who hold responsible positions in aviation, including Messrs. G. B. D. Williams and L. Spoor, both being instructors of the Club; R. King, of the African Flying Services; D. Labistour, who was with Union Airways; G. Elliott-Wilson, of Imperial Airways; G. Danby Gray, of the London and Rhodesia Mining and Land Corporation; M. Bowker, of Rhodesian Aviation Co.; R. Bourlay, of Christowitz Air Services; and R. Francis, the pilot for the Hon. John Stuart's "Dragon." The Club's machines recently completed 900,000 miles of flying, and have carried nearly 10,000 passengers. The Club makes a speciality of night flying, and claims that in this respect it is to the forefront in South Africa and

can even compete with most clubs in the British Isles. A project for the immediate future is the extension of its present activities by amalgamation with the Johannesburg Polo Club, and close co-operation with the Rand Hunt Club and the Field Trials Club; negotiations are also going on with the Board of Civil Aviation and the Crown Mines, Ltd. It is intended to build a large clubhouse on the southern boundary of the aerodrome and to augment considerably the existing amenities of the Club by incorporating a swimming bath, and tennis and squash courts; a golf course may also be laid out adjacent to the aerodrome.

KARACHI AERO CLUB

September was another successful month, the flying hours totalling 237, which, although not up to August's total, is higher than was anticipated. On September 20 Mr. C. J. Rae, executive engineer, Begari Canals Division, an "A" licence member of the Club, flew to Jacobabad and carried out an aerial survey of the district, the machine being hired by the Government for the purpose. During the month a "Puss Moth," which de Havilland's had been using as a demonstration machine, was purchased by the Club; it has proved a very popular machine, and put in 44 hr. flying between September 19 and 30. On September 26 the "Aurora," one of Indian Trans-Continental Airways' machines, was held up at Jodhpur by illness on the part of the pilot. Imperial Airways hired one of the Club's machines to fly Capt. Eggesfield to Jodhpur to fly the machine back. The Club did another little job for Imperial Airways about the same time, flying a film down to Bombay. Two members are to be congratulated on obtaining "A" licences, Messrs. H. P. Pathak and S. R. Ghodke.

NORTHERN INDIA FLYING CLUB

The Northern India Flying Club was formally opened on October 12. This is the same Club which unfortunately came to grief under another name. The chief instructor of the new Club is Flt. Lt. H. W. Raeburn, the chief patron is His Excellency the Governor of the Punjab, and other noted patrons are the Nawab of Bahawalpur, the Raja of Kalsia, and the Maharaja of Darbhanga.

JODHPUR FLYING CLUB

The Club's flying for September amounted to 19 hr. dual and 37 hr. solo, five machines having been used during the month.

KATHIAWAR FLYING CLUB

The flying returns for the month of September show a total of 77 hr. 35 min. dual and 41 hr. 15 min. solo, with four machines in service, a D.H. "Puss Moth," two D.H. 60G. III "Moths" and a Blackburn "Bluebird."

Everson Flying Services

A NEW company, with Lady Cathleen Nelson and Mr. R. W. Everett as its sponsors, has been formed in Dublin and will be known as Everson Flying Services. The company has secured the lease of Kildonan aerodrome, Finglas, near Dublin, which was formerly operated by Iona National Airways, and has also taken over the two aircraft—a "Fox Moth" and a "Gipsy Moth"—used by Iona organisation. Lady Nelson's Stinson monoplane is being put into service with the new company, and the purchase of a Miles' "Hawk" is contemplated. Everson Flying Services will engage in instructional work, and machines will always be available for private charter. Mr. J. R. Currie has been appointed chief pilot and instructor, with Mr. R. W. Griffiths as his assistant.

A new Renault engine

THE Renault works at Billancourt, near Paris, are soon to produce a new air-cooled six-cylinder in-line engine with a capacity of 9.1 litres.

"Setting the Thames on fire"

TO-DAY, December 14, Mr. F. A. Horner will place before the Court of Common Council of the City of London sketch plans of a landing ground built in the form of a huge bridge or platform over the Thames between Southwark and Blackfriars bridges, with the recommendation that the City Lands Committee should report its findings to the Court as early as possible. The platform would, presumably, be situated at a height sufficient to clear the masts of shipping, and would span the whole width of the river, while the length would depend upon the distance available between bridges. The idea is certainly no more fantastic than the building by America of Armstrong

"Seadromes," but whereas America will be able, and apparently intends to try out the scheme with a quarter-section "Seadrome," the Thames project can only be tried out at full scale.

A really artistic film

ON Wednesday, December 6, Mr. Elton showed before the members of the Royal Aero Club a film entitled "Aero Engine."

Mr. Elton was for some time in charge of the film-making side of the Propaganda Department of the Empire Marketing Board, but since that organisation has been closed down his activities have been transferred to the Propaganda Department of the Post Office. As Mr. Elton himself explained, the film was primarily designed and taken to show the craftsmanship and the personal factor which lay behind the making of an aero engine. It certainly did that, and did it in a most artistic and impressive fashion. His studies both of the workmen themselves and of their actions were almost invariably taken from a seldom seen angle, and yet they lost none of their realism. Mr. Elton appeared to have achieved beauty and art where few people would have thought them to exist. The series of aerial photographs with which the film finished were among the finest we have ever seen, and his cloud photography in particular belies description. His connection with the Post Office would almost seem a heaven-sent opportunity for this country to have a really well put together film of our great Empire air-mail services. We commend the idea to those in authority at the G.P.O., and trust that they will for once forget their apparent antagonism to a system of mail carrying which, despite any brakeing effect they may apply to its progress by their attitude of defeatism, will certainly be the system of the future.

AIRISMS FROM THE FOUR WINDS

The Lindberghs push on

On Wednesday, December 6, the Lindberghs reached Port Natal, Brazil, after making the South Atlantic crossing from Bathurst, Gambia, in 15 hr. 55 min. The distance is 1,900 miles. Except for a few squalls, which were encountered before reaching the island of Noronha, they had good weather. For 14 hours they rested at Port Natal, where one wing of their "Sirius" was repaired. On Friday, December 8, they arrived at Para, having made the 1,094 mile trip in 7 hr. 15 min. Three days later they flew 800 miles inland to Manaus.

A Belgian entry for the Oases air rally

M. GUY HANSEZ, an owner pilot, and the only Belgian entrant for the "Oases Air Rally," has flown out to Egypt in a "Fox Moth" accompanied by Madame Hansez (navigator) and Madame Stampe. The route taken was as follows:—Tuesday, December 5, Antwerp-Paris-Toulouse; Wednesday, December 6, Toulouse-Barcelona-Alicante; Thursday, December 7, Alicante-Oran-Laghouat; Friday, December 8, Laghouat-Tougourt-Tripoli; Saturday, December 9, Tripoli-Tobruk-Benghazi; Sunday, December 10, Benghazi-Mersa Matruh-Cairo. The decision to follow this route was made as the result of conversations with various people at the North Africa Air Rally earlier in the year.

Two Antarctic expeditions

MR. LINCOLN ELLSWORTH, Sir Hubert Wilkins, Lt. Bernt Balchen and the other members of the expedition, which intends to fly across the Antarctic Continent from the Ross Sea to the Weddell Sea, are at present on the way to the Bay of Whales. The *Jacob Ruppert*, the flagship of Admiral Byrd's Polar Expedition, arrived in Wellington (N.Z.) on Tuesday, December 5. Admiral Byrd sailed for the Bay of Whales on December 12 after having loaded stores.

Those Lockheeds

SPEED is the principal justification for flying. The Lockheed Aircraft Corporation is making money from speed: in five months it has multiplied its staff by six. Our commercial airways are speed starved. The reason has been oft repeated—there is no demand for really fast commercial aircraft in England. We do not intend here to argue on the question of fast commercial flying, but rather to give a little information about some very fast American machines—the Lockheeds—and to let British entrants for the MacRobertson International Air Race know what kind of competition they may expect from America. It has been revealed by Lloyd Stearman, President of the Lockheed Aircraft Corporation, that several wealthy American aviation enthusiasts have planned to enter "Orion" monoplanes for the race to Australia. Not only Americans, but foreign pilots intend to fly Lockheeds; indeed, our own Amy Mollison has expressed a hope that she may be the pilot of an "Orion." Mr. Stearman states that an

American entry should win the race. Aircraft in that country, he says, embody many improvements not available in European machines. We do not, of course, entirely agree with Mr. Stearman's statement, but we have to admit that in the construction of fast commercial aircraft, adaptable to long-range work, America has had more experience than we. We can tell America that our constructors have something up their sleeves. We have hopes. A little of the latest news from the Lockheed factory is quite exciting to many of us in a country where the cruising speeds of the majority of the commercial aircraft still lie round the 100-m.p.h. mark. The Lockheed "Orion" design is not new, but with a supercharged "Wasp" SIDI engine the machine will cruise at over 206 m.p.h. at 8,500 ft. American Airways have just bought some new "Orions." They are using these on what is claimed to be fastest mail and "express" service in the world. The schedule calls for a speed of 180 m.p.h., including stops for re-fuelling, loading and unloading. One of the machines made the trip between Chicago and Cleveland at an average speed of 222.5 m.p.h. John E. Maybee, an "oil king" of Tulsa, has purchased an "Orion" for business use. The "Vega" type is still popular. Wiley Post is having his reconstructed for another spectacular flight—this time, it is rumoured, at a high altitude. Capitol Speed Lines recently opened a high-speed service between San Francisco and Sacramento, on which "Vegas" with "Wasp" engines are being used. The journey is made in 30 min. Three "Electra" twin-engined low-wing monoplanes are being completed for Northwest Airways. A description of the "Electra," which will cruise at 180 m.p.h., appeared in FLIGHT for July 6, 1933.

R.A.F. pilot lands in Hyde Park

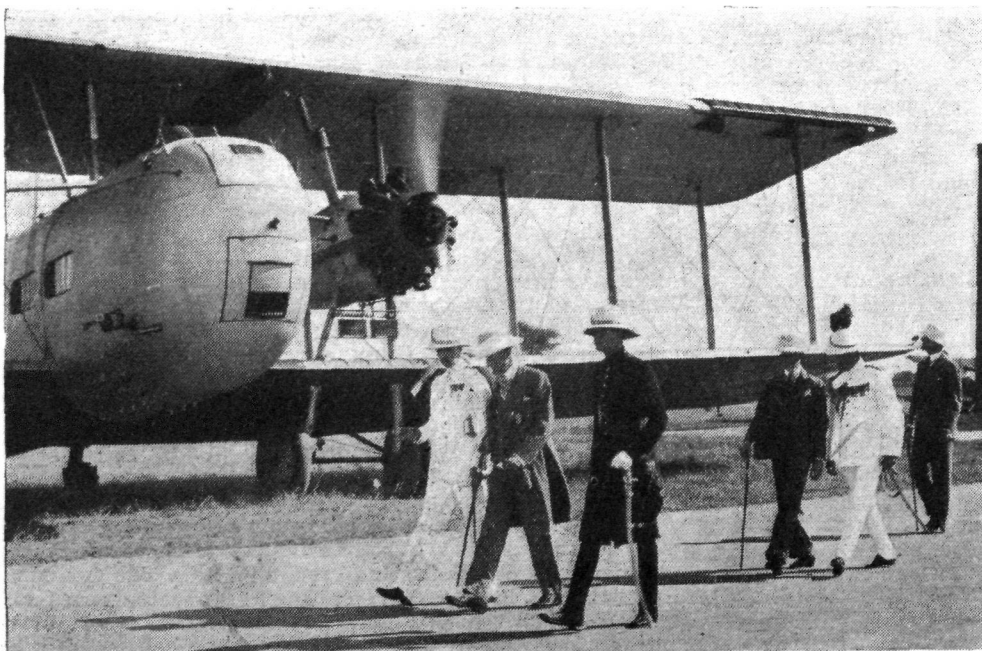
On Monday, December 11, a single-seater fighter "Bulldog," of No. 31 Fighter Squadron stationed at Northolt, forced landed in Hyde Park. The pilot was F/O. F. G. L. Smith, and it appeared he had engine trouble while flying in formation over London. F/O. Smith is to be congratulated on making an excellent forced landing without damage to his machine and without hurting any of the public. He also provided the evening papers with something uncommon about which to "shoot a line," and gave Londoners an excellent opportunity of seeing at close quarters a service single-seater fighter.

Egyptian air squadron arrives

THE Egyptian Air Squadron, which left England on November 18, arrived in Cairo on Thursday, December 7. They were received by His Majesty the King of Egypt, his Ministers, and a large assembly.

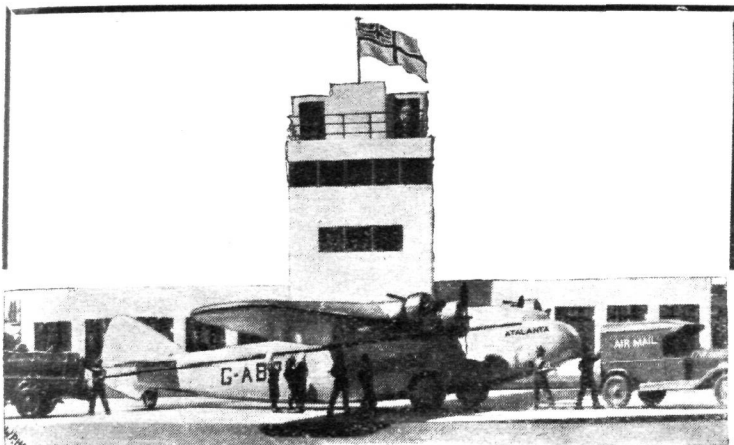
Everest airmen visit Paris

FOUR members of the Houston-Everest-Flight, Col. P. T. Etherton, Mr. L. V. Stewart Blacker, Flt. Lt. D. McIntyre and F/O. R. E. W. Ellison, were the guests of the Société de Géographie at an informal dinner in



THE VICEROY IN JODHPUR :

For the first time in history a Viceroy has arrived in state by air in the Rajputana State of Jodhpur. H.E. Lord Willingdon, accompanied by Her Excellency and staff, arrived there in his own Avro 10. In his speech at the official banquet His Excellency said that Jodhpur Aerodrome was an important link in the chain of Imperial communications and was one of the finest in the East, being equipped with an excellent hotel and every modern necessity for air transport. He also mentioned that there were 15 landing grounds in the State. He congratulated His Highness the Maharaja on the achievements of his ten years' rule.



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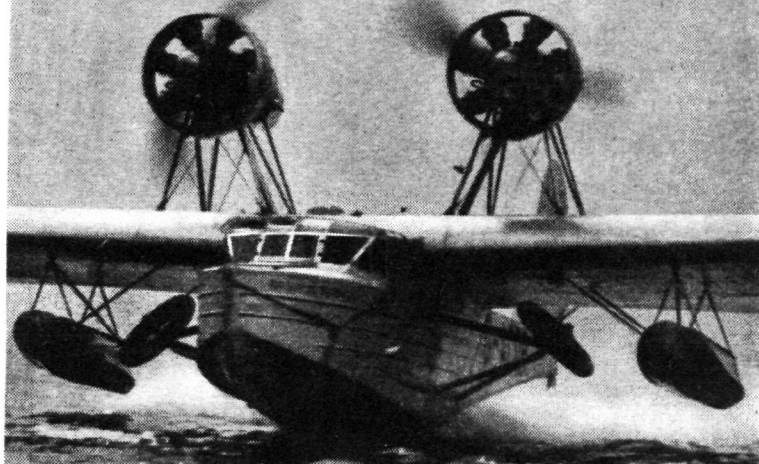
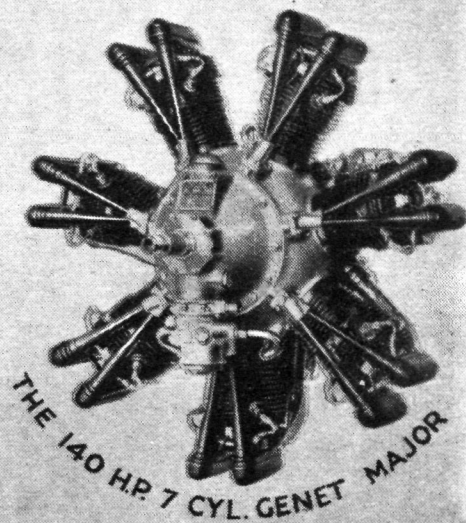
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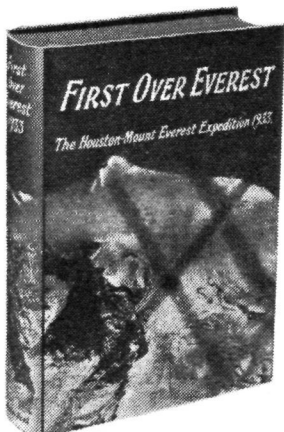
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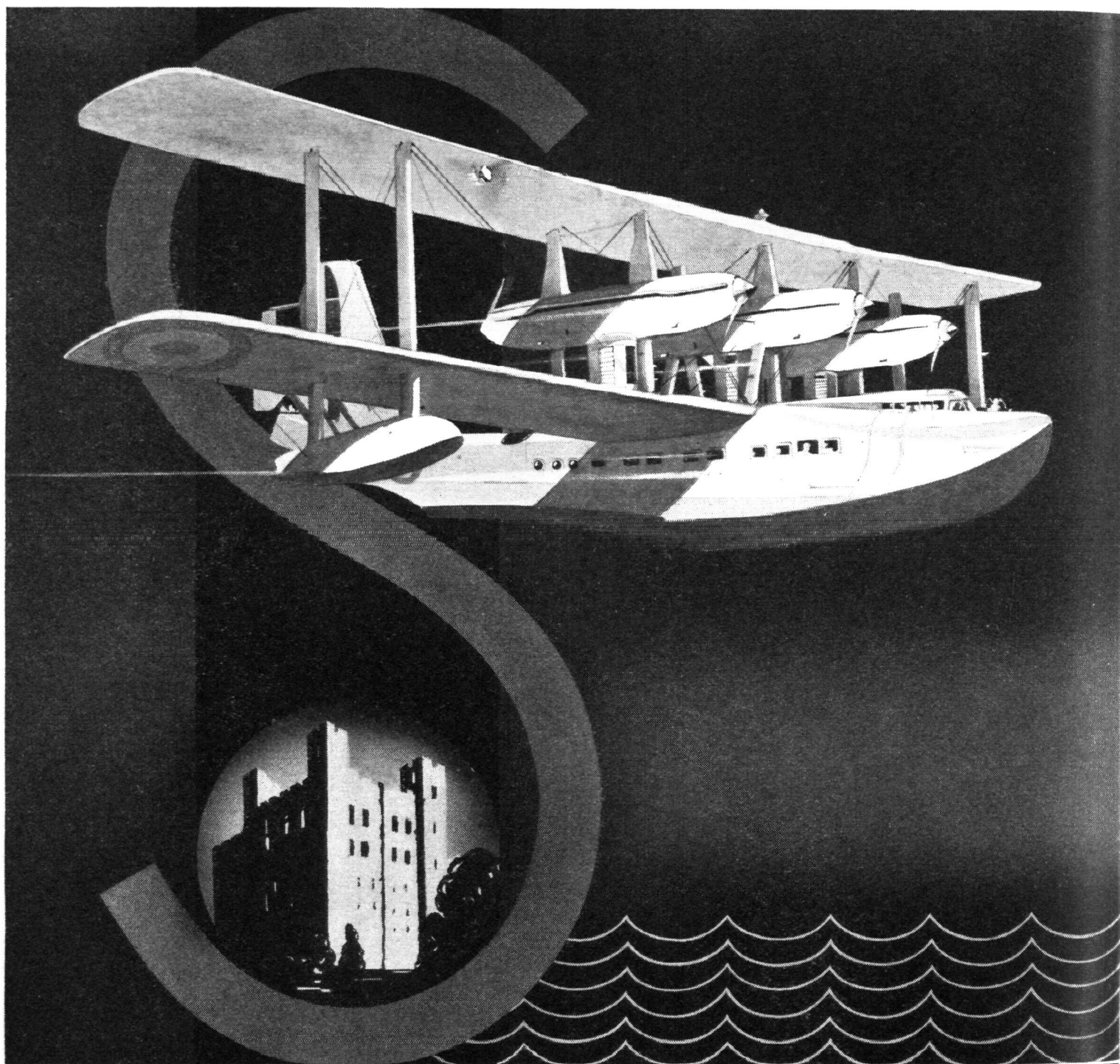
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SHORT BROS.
R O C H E S T E R

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Paris on Thursday, December 7. On the following day they attended a reception at the Sorbonne, at which the President of the Republic was present. Following this reception Mr. Blacker gave a lecture in the Grande Salle on the work of the Expedition. On Saturday, December 9, President Lebrun received the members of the expedition at the Elysee Palace.

Robot Stratostat in U.S.S.R.

PROF. A. P. MOLCHANOV, director of the Slutsk Aerological Institute and inventor of the "radio balloon," has announced that his design for an automatic 100 per cent. robot-equipped stratostat has been accepted by the proper authorities and will be constructed by next spring. This crewless stratostat will be equipped with a special robot apparatus which will transmit by radio data on the condition of cosmic radiation in the upper reaches of the stratosphere.

Scientific results of the Russian stratospheric flight

THE first results of the analysis of the scientific material obtained by the balloon "USSR" in its flight into the stratosphere on September 30 last have been published in *Izvestia* and other organs of the Soviet press. Professor A. Wanganheim has stated that the provisional analysis provides grounds for a new theory on the composition of the stratosphere. Several problems may be solved when analogous material has been obtained in future flights. A commission, headed by Academician S. I. Vavilov, has analysed the records on cosmic rays. In his statement Professor Wanganheim says that it is well known that cosmic rays in the lower spheres call forth very little ionisation in the air, forming no more than one or two ions a second in each cubic centimetre. Records of the stratosphere at an altitude of 12 km. show 226 ions in a cubic centimetre per second, at 15 km. 342, and 360 at 17.7 km. The data is at variance with Professor Rengener's, but confirm the results obtained by Professor Piccard. To a certain extent they confirm the hypothesis of the cosmic origin of these rays, also indicated by Professor Piccard. In the opinion of Professor Wanganheim the findings in connection with the flight of the "USSR" are particularly interesting in that they give an analysis of the air taken at an altitude of 18.5 km. and displace hypotheses which had never been confirmed. The findings may be reduced to:—Firstly, that atmospheric pressure is approximately 50 mm. on the quicksilver bar; secondly, that, at the most, moisture of less than 0.7 per cent. was found in the atmospheric samples taken in the stratosphere; thirdly, a chemical analysis has shown that the air contained 20.95 per cent. of oxygen and 78.13 of nitrogen and 0.92 per cent. of argon and other rare elements. The conclusion drawn is that the composition of the air 18.5 km. above the earth is the same as in the lower spheres. The records on Professor Molchanov's meteorograph show that immediately before reaching the stratosphere the temperature of the air was about 62 deg. below zero. In the stratosphere it fluctuated between 53 and 56 deg. When descending, the temperature immediately after leaving the stratosphere was 60 deg. below zero. Consequently there were sharp jumps in temperature both when ascending and descending. The higher the balloon rose, the lower became the humidity or moisture in the air. Near the earth there was 96 per cent., but at the border of the stratosphere the humidity dropped to 42 per cent. We hope shortly to publish further technical details of the balloon "USSR."

Italian long-distance flights

LOMBARDI AND MAZZI, the Italian pilots, are planning some long-distance commercial flights. The first will be made in January, when, using a Savoia-Marchetti S-71, the pilots will attempt to fly from Rome to Buenos Aires. The machine will have a range of 2,500 miles at 158 m.p.h. A crew of four and 1,100 lb. of mail can be carried.

30 years of flying

THE first day of next week marks the thirtieth anniversary of the first flight made in a heavier-than-air machine. On December 17 of the year 1903 Orville Wright made the first aeroplane flight in the history of the world, in a machine designed and made by himself and his brother Wilbur. Later in the same year he made a flight lasting 59 sec. over a distance of 852 ft. In the year 1933 a flight was done by two Frenchmen lasting just over 55 hr., over a distance of 5,500 miles. The Wright brothers flew at a speed of about 30 m.p.h. The present speed record stands to the credit of an Italian with a speed of a little over 423 m.p.h. The Wright machine just lifted one person into the air, and he lay prone on his front looking at the earth below. The

Do.X carries not far off 200 persons in greater comfort than is obtained in most railway trains. The engine of the Wright aeroplane developed 12/15 h.p., the engines of the Do.X develop a total power of 7,000 h.p. The ceiling of the first Wright biplane was only a few hundred feet. A French machine has climbed to a height of 44,819 ft. So much for 30 years' flying, yet there are people who say that the development of aviation is slow.

From Cairo

THE first Egyptian, Mohamed Fawzi Effendi, to obtain his ground engineer's "A" licence is on the staff of Misr-Airwork S.A.E., in whose workshops he received the necessary training. He took his first responsibility in charge of a machine on December 2, when he accompanied Talaat Pasha Harb, a director of the company, with a party in a specially-chartered machine to the Hedjaz. Owing to the abundance of race-going passengers from Alexandria during the last week-end in November an additional 8-seater plane had to be put on the Cairo service.

Latest ground information

THE latest notices, which have been issued by the Automobile Association for inclusion in their A.A. Register of Landing Grounds, inform us that the Schedule (Z.A.) of Edzelli landing ground should be withdrawn from the register, as the field is being ploughed, while the Panmure Hotel is closed for the winter. It is hoped that an alternative ground will be prepared for the next season. Concerning Carlisle (Schedule M.B.), the area is being extended by the removal of a hedge on the south side, but the surface has not yet been levelled and consolidated, and only the landing area described in the schedule should be used. Two petrol pumps are being erected in the south-east corner.

Good Omens for the Airports conference

IT is proposed by the Brighton, Hove and Worthing Corporations to create a joint municipal aerodrome at Shoreham-by-Sea. The Air Ministry has already given consent. According to present plans, the aerodrome will be leased for 28 years to Southern Aircraft, Ltd., which company is to be reconstituted with a capital of £150,000. The West Hartlepool Corporation proposes to establish a municipal aerodrome at Greatham, where there is a site of 150 acres. On Monday, December 11, the Walsall Council authorised the spending of £2,160 on a hangar and other equipment for the airport site which has been acquired by the Corporation.

The Belfast airport

THE Belfast Harbour Commissioners are to seek the advice of an expert with regard to the aerodrome which they are establishing on reclaimed land on the shore of Belfast Lough. The surface, at the present time, is inclined to be soft, and is not considered suitable for use by passenger machines operating on regular services, and the Commissioners are anxious to have the airport licensed for all types of aircraft as soon as possible. The Glasgow-Belfast service of Midland & Scottish Air Ferries uses Aldergrove aerodrome, which is about eighteen miles from Belfast.

More aerodromes for U.S.A.

THE directorate of Aeronautics at the U.S. Department of Commerce has announced plans for the establishment of 2,000 additional landing grounds in the United States; 10,000,000 dollars (over £2,000,000) of the civil works funds has been set aside for this purpose. The main object is to extend the Federal Airways system to all parts of the country at present not served by airways and thus to increase the safety of private flying.

Fighters for Dutch East Indies

THE Aviation Department of the Dutch East Indies recently held a competition for aeroplanes of the "fighter" class. Fokker and Curtiss productions were submitted to severe tests, which resulted in an order for 14 Fokker machines being given. Formerly a number of Curtiss "Hawk" fighters had been ordered.

A Zeppelin Commander speaks

BARON VON BUTTLAR, the War time Zeppelin commander, spoke to a Berlin audience on December 5 of his experiences. The military value of his raids on England was, he admitted, insignificant. He claimed, however, that they had great moral effect.

A Curtiss-Wright factory in China

AN aircraft factory costing about £1,000,000 is to be built in China by the Curtiss-Wright Corporation. Financial assistance will be given by the Chinese Government, which has agreed to buy machines built in the factory. China already uses the Curtiss "Hawk" single-seater fighter.

AIRPORT NEWS

CROYDON

SATURDAY last saw the departure of a record air mail, when the Imperial Airways machine left at 12.30. More than 80,000 letters, approximately a ton of mails, were sent by air to places along the line to Singapore, and that city celebrated its recent link with England for air mail purposes by having a very fair share of the mails addressed to it. When the African mail plane departs on Wednesday, December 13, another record mail is expected, and Imperial Airways' traffic staff here are making special preparations to handle it. Among the latest air travel enthusiasts, who thoroughly enjoyed their journey, were A. C. J. van Vossen, H. Kjaer and S. Strömman, the Danish Badminton team, who arrived in London by K.L.M. A.B.A. Scandinavian Air Express on December 5.

Airline pilots are not born—they are very carefully made in these days of large aeroplanes carrying up to 40 passengers. Two Imperial Airways pilots with "masters tickets" for most types up to "Argosies," are at present training as first officers on board "Heracles" types daily, in order to get their tickets for the biggest machines of the fleet. Their names are Messrs. Tweedie and Gittings.

Something of a mystery man, Dr. Hanfstaengl, said to be a Nazi Press chief and a personal friend of Herr Hitler, left London for Berlin by D.L.H. on Friday last. He is said to have been here purely for a holiday.

Mr. Parmenter, of the Royal Dutch Air Lines, who has been in the United States studying air routes there with special regard to radio beacons and night-flying facilities, is now back on the regular routes, and was at Croydon recently. He experienced the greatest hospitality in America, and was allowed to fly as second pilot over several routes. He has much of interest to tell about American civil aviation, and he explodes the myth that all American civil machines cruise at about 200 m.p.h. The present average speed on American airlines is not higher than in Europe. There is a great deal to be said in favour of sending a genuine air line pilot rather than a director to other countries to study the practical side of air line flying.

During last week we had more than our share of fog, and alternative ports such as Lympne and Gravesend were used. One day the lay Press will learn that air traffic is not necessarily "dislocated" by the wise use of an airport other than Croydon in certain types of weather. One K.L.M. machine disembarked its inward load at Gravesend and, by special permission of H.M.

Customs, immediately and courteously given as soon as asked for, cleared both passengers and cargo outwards from Gravesend, and never came near Croydon at all. That would appear to be the correct use of a well situated and well equipped coastal airport.

Customs facilities for outward clearance of passengers and freight do not yet exist at Gravesend, and if Lympne with its Customs organisation is clear of fog, embarkation at Gravesend must be followed by a flight to Lympne for outward clearance. It is hoped this inconvenient arrangement will shortly be no longer necessary.

It is a pity the newspapers do not pay more attention to their facts, especially in air matters. Referring to inward bound Royal Dutch Air Lines passengers landing at Gravesend, one newspaper said: "Customs officials refused to deal with them at Gravesend, and the liner had to call at Lympne for this purpose." This is totally inaccurate. Inward bound passengers may be cleared within a few minutes of their arrival at Gravesend and proceed to London immediately.

A curious situation in connection with "Zone Traffic Control" arose recently, when some wireless fitted R.A.F. machines wished to leave Biggin Hill during a period when the Control was in force. Biggin Hill is within the area, and although the routes were clear and the Control Tower (like Barkis) was willing, the orders issued to the R.A.F. precluded any flying by their machines within the "Zone" during a control period. I suppose this is a matter which will shortly be put right.

Several privately-owned non-wireless aircraft have trespassed, all unwittingly, in the Control Zone recently. They have been mildly admonished for not looking at the weather panels at Lympne or Littlestone before proceeding to Croydon.

I was recently informed that the outward plus inward passenger traffic of K.L.M., London, had increased by 105 per cent. in November, 1933, over the same month last year.

It is said that Sabena will acquire two new fast machines for their air routes to and from Croydon next summer. One is to be a twin-engined "Caproni" and the other a Dewoitine.

Mr. J. de Vries, Foreign Manager, K.L.M., arrived during the week by Imperial Airways from Paris, and Mr. Schmidt Reu, of D.L.H., left by his own service for Berlin.

A. VIATOR.

FROM HESTON

MR. F. A. I. MUNTZ, Managing Director of Airwork, Ltd., recently enjoyed on Lord Londonderry's Belfast estate his first holiday since the company was formed in 1928. It now transpires that Mr. Muntz's holidays are no less fruitful than his business journeys to the East—on another of which he has just started—for plans for the laying out of an aerodrome and the operation of an Airwork Depôt on this same Belfast estate, Newtonards, are now well on the way. The Irish charter trips frequently undertaken by the Airwork Manchester Depôt would be considerably simplified by the co-operation of an Airwork branch in Ireland.

"Gipsy Moth" CY, a veteran of 2,000 hours, is due to have her face lifted. She is coming in for renewal of Certificate of Airworthiness, and in order to keep her on the active list, another rebuilt fuselage is being painted with the appropriate cosmetics, and will be grafted painlessly on under an anæsthetic.

Wrightson & Pearce have, in addition to their charter service, set up as aircraft brokers. They will inspect a machine, advertise it for a reasonable time, and demonstrate it anywhere within 100 miles of London, all for an inclusive charge in the form of a percentage on the value of the machine when sold. The service has been in opera-

tion for about a week, and already about a dozen inquiries have come in both from prospective buyers and sellers of aircraft. Another machine has been acquired by Wrightson & Pearce for their "drive yourself" aeroplane hire service. It was thought that a faster machine than the "Cirrus II Moth" already in use would be appreciated by hirers, and a "Hermes II Avian," cruising at 95 m.p.h., has accordingly been purchased. This will be available at the usual low rate of £2 a day, fuel and insurance to be at the expense of the hirer.

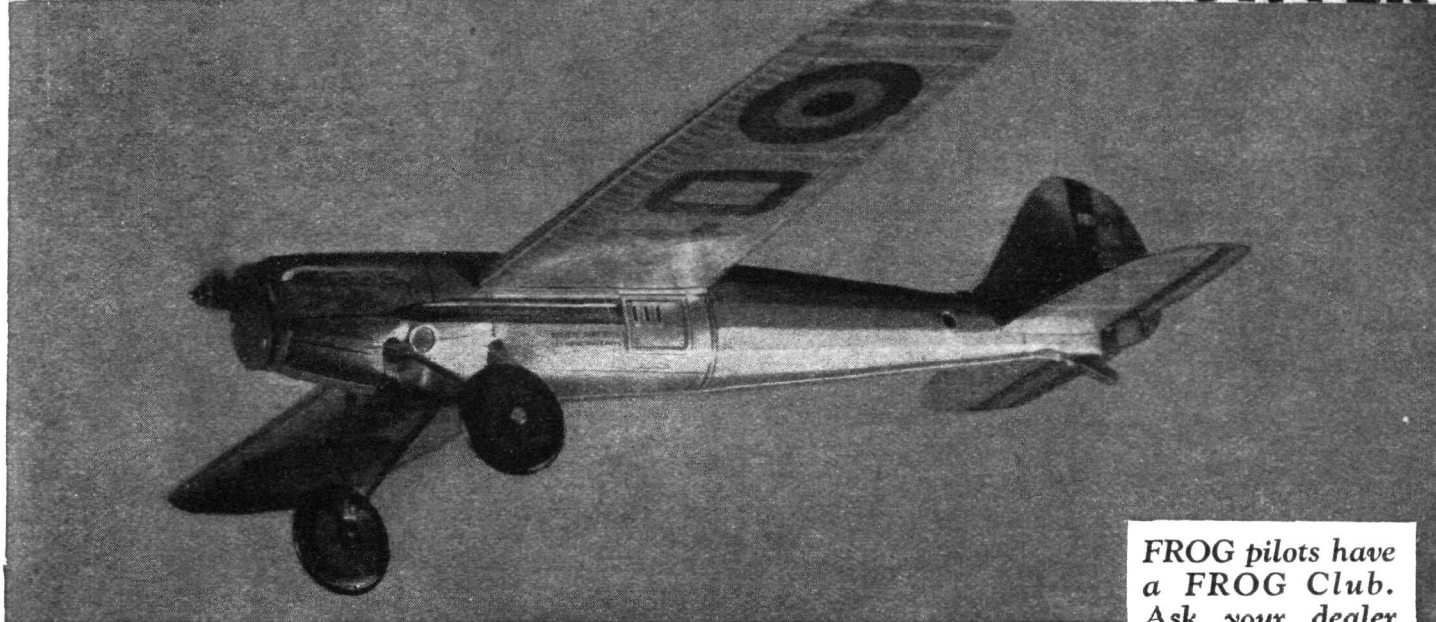
Mlle. Maryse Bastié, the famous French airwoman and sales pilot to the firm of Potez, left Heston on Monday for France with one of their products—a roomy cabin two-seater.

Mr. Fairweather has been trying for three days to get away to Rotterdam. Apparently the Clerk of the Weather did not catch the name.

Mr. Nigel Norman, Chairman of Airworks, Ltd., will shortly take delivery of the first production model of the de Havilland "Leopard Moth." With a "Gipsy Major" engine, this machine has a cruising speed of 118 m.p.h., a landing speed of 48 m.p.h., and all the very pleasant flying characteristics of its precursor, the "Puss Moth."

FOR CHRISTMAS

THE FROG INTERCEPTOR FIGHTER



FROG pilots have a FROG Club. Ask your dealer for entry forms, or write to us.

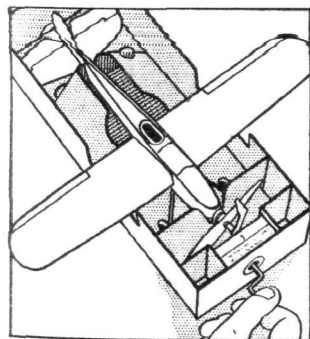
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THIS machine *really is* to scale, the photograph is genuine and the machine is not touched up in any way.

The FROG is the only representative scale model made that really flies off the ground with a rapid climb.

Here are its unique points, not approached by any other machine:—

OVERALL LENGTH - $9\frac{1}{2}$ ins.
WING SPAN - - - $11\frac{1}{4}$ ins.
NORMAL
FLYING SPEED 650 ft. per min.
LENGTH OF FLIGHT 300 ft.
HEIGHT OF FLIGHT 70 ft.
SCALE - three-eighths in. to 1 ft.



NO TEDIOUS WINDING
One of the many features patented in all manufacturing countries is the special geared-up winding device built into the FROG'S box, by which it can be fully wound for flight in 15 secs.

SCALE PERFORMANCE: The propeller is correctly speeded up by accurately cut gearing, so that the airscrew is correctly to scale without sacrificing correct scale performance (scale speed of 236.36 m.p.h.)

'CRASH PROOFNESS': No machine, large or small, can withstand every form of abuse, but the FROG stands a wonderful amount, owing to its special design and aluminium alloy fuselage. The main planes, undercarriage and 'gear box,' for instance, are so attached that on encountering any substantial obstruction they detach instead of breaking. The machine in the photo had been crashed a dozen times. Spare parts are accurately interchangeable.

EVERY ONE TESTED: Each model has to 'take off' with a short run, climbing to clear a set obstruction before it is passed.

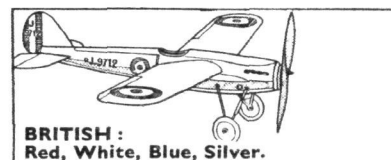
AEROBATICS: Loops and other stunts are easily arranged.

Price, including box with geared-up winder, winding handle, motor lubricant and fixture, gearing lubricant and full instructions - - -

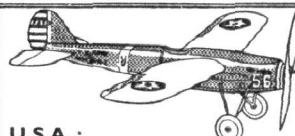
7/6

Obtainable at all Sports and Toy Shops. In case of difficulty write to Sole Concessionaires:

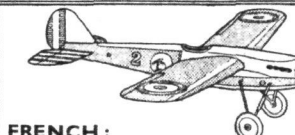
LINE BROS. LTD TRIANG WORKS, MORDEN ROAD, MERTON, S.W.19
British made by International Model Aircraft Ltd.



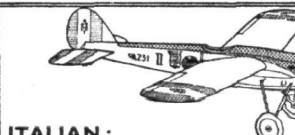
BRITISH:
Red, White, Blue, Silver.



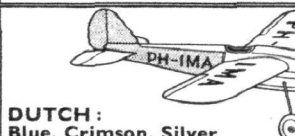
U.S.A.:
Green, Orange, Red, White, Blue.



FRENCH:
Dark Green, Red, White, Blue.



ITALIAN:
Red, White, Green, Pale Yellow, Blue.

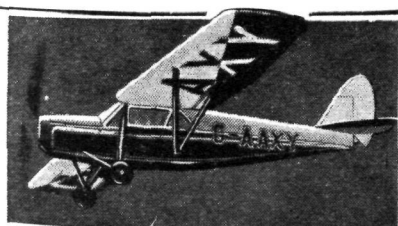


DUTCH:
Blue, Crimson, Silver, Grey, Pale Yellow.



ARGENTINA:
Silver, Pale Blue, White, Gold.

BELGIAN: Red, Black, Yellow, Silver.
As shown in photo.



The PUSS MOTH
de Havilland Monoplane

18 in. span: height of flight 100 ft., 17'6
length of flight 600 ft.

FROG

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TO
DECORATIVE CABINS**

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THE "APPROVED INSPECTORS" DINNER AT SHEFFIELD

WE have two good reasons to believe that the system of "approved inspection" is a success. The first is that we heard Lt. Col. Outram make a definite statement to this effect at the Approved Inspectors' Dinner given last Wednesday, December 6, by the A.I.D. at the Royal Victoria Station Hotel, Sheffield. As the other reason we give our impression of the friendship and goodwill existing between the hosts and the guests at the dinner—the A.I.D. and the Approved Inspectors.

It was suggested last year at the dinner that some form of round table conference should be held quarterly at Sheffield to give the A.I.D. and the Approved Inspectors an opportunity to argue their differences. A scheme similar to this is actually at present in operation. It was decided, however, that the conferences should be held, not quarterly, but as occasion requires. So far, we are pleased to say, there have been no conferences.

The Sheffield steel firms are busy now. Compared with last year the number of consignments of aeronautical goods has increased by 7,000. Aircraft parts ranging in size from wires 0.008 in. in diameter to complete aero-engine crankshafts are being made in the Sheffield district. Not long ago orders used to arrive for a few pounds of stainless steel; orders are now given in tons.

While talking of stainless steel, we would congratulate Mr. Harry Brearley, the discoverer of this commodity, who, on the day of the dinner, celebrated his 50th year in the steel trade. We wonder if, when, as a youth, he experimented in the laboratories of Thos. Firth & Son, Mr. Brearley thought that years later this steel, which he has done so much to perfect, would be used for the construction of some of the finest military aircraft in the world.

Of the dinner we will say that it is a bigger success each year. It is an occasion when the A.I.D. and members of the approved firms meet socially and informally, although the speeches usually contain constructive criticisms and useful suggestions.

Mr. NOEL LINDLEY, the Inspector in Charge at the Sheffield office of the A.I.D., was in the Chair. He regretted the absence of Mr. David Flather, the chairman of last year's dinner. Before a previous dinner, Mr. Lindley had received a telephone call from a gentleman whose name was unknown and whose qualifications for an invitation to the dinner were quite inadequate. The omission of the invitation having been explained to this unfortunate person, who was doomed to languish in the outer darkness, he retorted that the diners seemed a very "exclusive lot," which remark Mr. Lindley accepted quite cheerfully. The Sheffield industries, said Mr. Lindley, had recently received a great deal of hostile criticism from people who probably owed their safety to the products of those very industries. In peace and war they really counted for something, and it was a real pleasure for the A.I.D. to be associated with the firms and their men.

Lt. Col. H. W. S. OUTRAM, Director of Aeronautical Inspection, proposed a toast to the Approved Firms. To do his job properly, he said, a survey of all the firms should be made, and he should say a few nice things about each. Actually, he gave a review of the work during the past twelve months. He mentioned the improved offices of the A.I.D. in Sheffield, and told how Mr. Lindley now drives a six-cylinder car instead of a "four." Mr. Lindley later explained that this car belonged—not to him, but to the Department. His own was a "two." The number of approved firms had increased, during the past year, by seven, making a present total of 126. On the surface, these figures might seem rather small, but it must be remembered that the figure for last year covered most of the people in Sheffield interested in aerial work of any sort. It seemed from the increase in the number of acceptances to the dinner this year that the new firms had each sent three representatives, but Lt. Col. Outram explained that he had brought some friends from headquarters, who would probably account for some of the number. Continuing with his statistics, Lt. Col. Outram gave the number of release notes as 25,000, an increase of 7,000 over last year. Six D.I.R. reports had been made—eleven less than last year. On personally studying these, Lt. Col. Outram found that five of them covered complaints which involved matters of personal opinion—the kind that must be expected, and

indicated no fault in the inspection work. The sixth report applied to some braided electric cable, and this was not produced actually in Sheffield. At the dinner last year it was suggested that members of the approved firms should meet with the A.I.D. to discuss points of difference and procedure. This scheme was now in operation, due largely to the work of Mr. J. Wortley-Fawcett, of Thos. Firth & John Brown, chairman on the contractors' side. "No grouses" was, so far, the report of the committee. Everything, in fact seemed to be going along smoothly. This, Lt. Col. Outram said, was a bigger achievement than the reduction of D.I.R.'s. The system of "approved firms" had proved a success, and Lt. Col. Outram asked for continued co-operation in the scheme, for, as he pointed out, an isolated failure might have serious effects and discredit the whole system.

Alderman A. R. HABERSHON, of J. J. Habershon & Son, Ltd., replied to the toast proposed by Col. Outram. The system of "Approved Inspectors," he thought, originated in Sheffield. (Apparently Alderman Habershon has been misinformed. Sheffield was quite late in adopting the system, although it is now being employed to a very full extent.—Ed.) He mentioned the huge force of about 8,000 A.I.D. Inspectors in existence immediately after the war. Many of these inspectors were not qualified to carry out important work and there was much grumbling about the whole system then in operation. The Air Ministry, in fact, must have thought that all the grumblers had segregated in Sheffield. "Segregation," he thought, is some form of disease from which steel suffers. People in Sheffield think of steel in terms of its peculiarities and diseases. The term "true as steel" is not used in Sheffield as in other parts—the inhabitants know too much about steel. Alderman Habershon went on to tell of the work of Mr. Harry Brearley, a man of constructive mind and a distinguished metallurgist of Sheffield. Mr. Brearley was the discoverer of stainless steel, and on the day of the dinner celebrated a 50-years' connection with the steel trade. In collaboration with Major Bulman, of the Air Ministry, Mr. Brearley had done much to make the system of "approved inspection" a success. To him the aviation industry owed much for advice and help on difficult problems connected with the production of suitable steel for use in aircraft. In response to the appeal for the continued support of the "approved inspection" system, Alderman Habershon assured Lt. Col. Outram, on behalf of the approved firms, that the appeal had been taken very much to heart. In Sheffield at present there were increased activities in the steel trade. The theory that this revival was due to the placing of armament orders was completely wrong. He did not think that at any time had the armament trade been so slack. At the Iron and Steel Institute a lady tackled the head of a big armament firm about the "terrible business of the production of lethal weapons." Alderman Habershon had visited the actual works in question, in the company of the manufacturer, and found the big gun shop a hive of industry with the machines all fully occupied—and not a single gun in sight. The Government might rest assured that until universal disarmament arrives, Sheffield will do its best to supply the armed forces of the Crown with steel of the very best quality, whether required in the form of 14-inch armour plates or steel strip one-fourteen-thousandth of an inch thick.

Mr. L. CHAPMAN, of William Jessop & Sons, Ltd., supported Alderman Habershon. He, too, declared that the armament trade had never had such a thin time. However, he assured the Government of the skill and technique employed by the steel firms of Sheffield. These firms could take care of any demands made upon them. The urgent demands of the aircraft users, he said, should never "rattle" the A.I.D. inspectors. They should let nothing put them off, but do their work steadily and consistently. Mr. Chapman maintained that there should be no two standards in the construction of aircraft when intended for either civil or military purposes. The maximum of efficiency of aircraft in all forms was desirable. Lt. Col. Outram and his staff might help the industry by keeping the designers of aircraft well informed of new specifications. The significance and importance of these was not always fully realised by designers and constructors. For the good of the steel producers and the aircraft manufacturers, Mr. Chapman asked for close co-operation between these two bodies. The more that was learned by the steel producers about the functioning of the various parts of an aircraft and the treatment which these parts would receive, the better for everyone concerned.

Major H. MYERS, Chief Inspector of Stores, Air Ministry, said that the Inspector was not always the "gentleman of the horns, tail and cloven hoof." It had been said that the A.I.D. Inspector acted as a policeman. A policeman, he said, does not have to know all about burglary. Major Myers commented on the technical superiority of our Air Force. This superiority was due, he explained, to the designers, manufacturers and the A.I.D.

Mr. C. G. H. RICHARDSON, of Ransome & Marles, proposed a toast to the A.I.D. To use his own words, he was an interloper, and it was his first visit to one of these dinners. He knew of the work of the A.I.D., however—he was an aircraft designer during the early days of the war. It had been said that the A.I.D. once had an enormous body of inspectors. This was true, but they had also collected a vast amount of knowledge and experience which was of use when, as a result of great foresight, the time came to appoint Approved Inspectors. Having had much experience of the manufacture of roller bearings, Mr. Richardson pointed out how these products were in some ways not comparable with the majority of goods. Experts were required for the thirty operations of their production, which involved a high degree of accuracy, finish and metallurgical technique.

Royal Aeronautical Society students' section informal supper

THE students of the Royal Aeronautical Society held an informal supper at the Ship Tavern, Kingsway, on Tuesday, November 28. The function was the first of its kind in the Student Section, and proved an outstanding success. The attendance was well over 60, and this excellent support from a very scattered body of students, hitherto unknown to each other, has done much to cement the student body into a corporate whole. Mr. R. J. Schmidt, the Chairman, proposed the toast of "The King." Mr. E. C. A. Backhaus then explained how pleased the Committee were to have obtained such excellent support. The discussion centred on the suggested formation of a flying club, whose object would be to encourage students to obtain their "A" licences. In order that the idea should materialise, the maximum possible support from the students would be

necessary, and that this would be the case was immediately evident from the note of enthusiasm sounded. Mr. Brittain, who is already the organiser of one highly successful flying club, very kindly supplied figures which proved that, with a minimum of 50 members, it was quite possible to run one machine successfully. He showed that, provided we could obtain adequate support from students themselves and from the Council of the Society, dual instruction could be obtained at considerably lower rates than were possible anywhere else. That assistance from the students themselves would be immediately forthcoming was evident, and in fact no less than 40 of those present definitely indicated their willingness to help, while students unable to attend the supper are now writing to add themselves to the existing number. The supper was therefore quite definitely a success from every point of view, and it was generally decided that this should by no means be the last of its kind.

IRVIN DEVELOP- MENTS

WE show in the accompanying illustrations two of the latest types of Irvin Parachutes, viz., the Pilot Seat Pack fitted with quick release harness, and a special Back Pack for use in cabin aircraft.

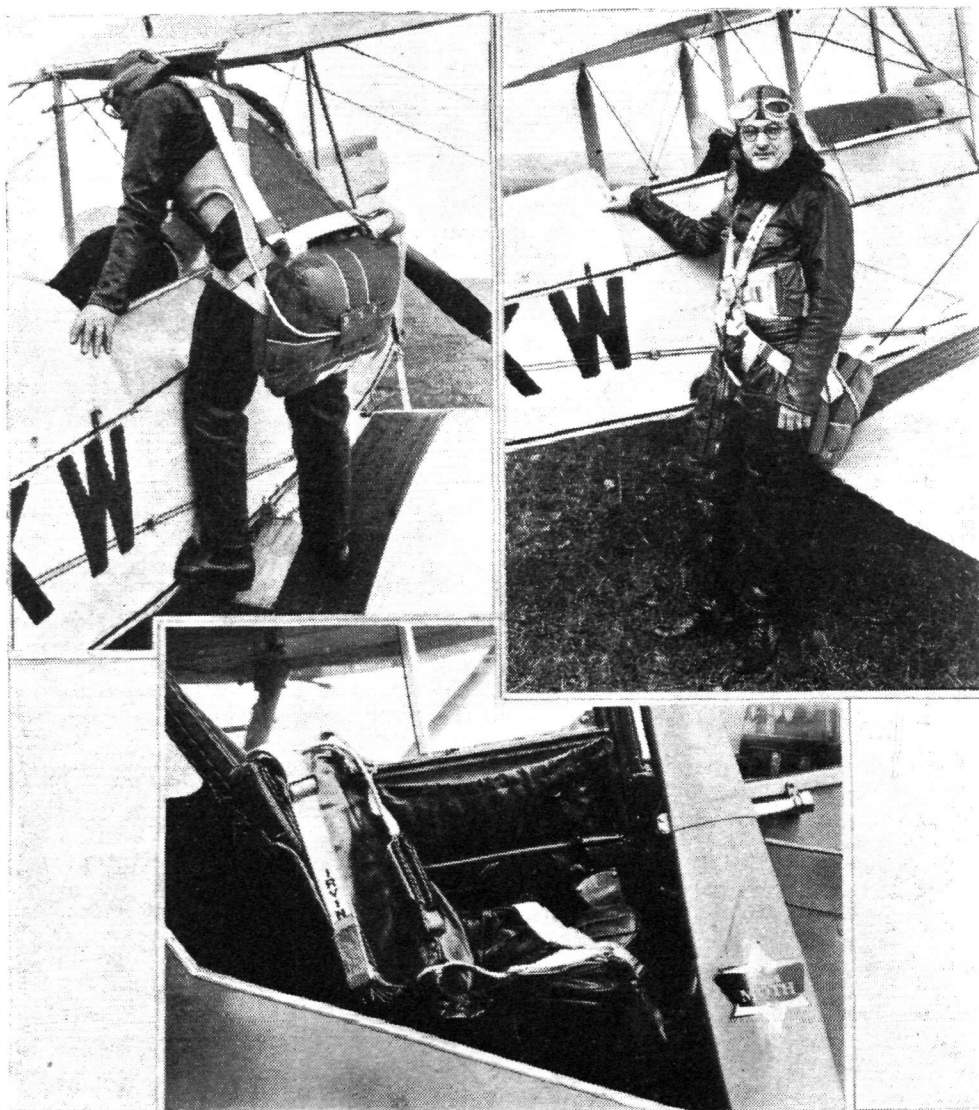
In the Pilot Seat type, shown in the upper illustrations, the chief improvement in design is the fitting of a broad belt to enable the rip cord ring to be placed in the most convenient position. This belt is adjustable and can be fitted to any pilot. The illustrations show the neat arrangement of a back pad and general style of the harness. In the front of the harness is the standard quick release fitting, now adopted by the R.A.F. for all types of harness.

Although the illustrations show the pilot with the parachute on him, this equipment can always be left in the cockpit seat and put on when the pilot is in his seat. As a preventative against rust the all-metal fittings in the harness are made of stainless steel. This type of harness is now standard in the British Royal Air Force and in many other naval and military flying services throughout the world.

It is also used by all the test pilots to our aircraft manufacturing companies.

The lower illustration shows the installation of a special back-type parachute with the quick release harness in the front seat of the Irving Air Chute Company's "Puss Moth." The Back Pack forms a back cushion in the seat, and is connected with the seat cushion to make one piece, the whole being upholstered in leather to match the upholstery of the cabin. An excellent effect is obtained, as can be seen in the photograph. The parachute always remains in the aeroplane, and it is an easy matter to attach the harness to the wearer when he is in the seat.

The Irving Company's "Puss Moth" is fitted with this type for both pilot and passenger, and has caused much favourable comment when on view at various aerodromes throughout Great Britain and abroad during the past year.



To allow easy access from the machine in the event of emergency, the hinge pins of the doors are connected to a wire which ends inside the cabin with an emergency handle. This arrangement is similar to the emergency chain in a railway carriage. When the handle is pulled the pins are withdrawn from the hinges and both doors fall clear from the aeroplane, exit for the occupants then being a very easy matter.

This arrangement was recently tested in the air by Mr. John Tranum, who found it only a matter of a few seconds before he was clear of the machine from the passenger's seat.

In conclusion, all these improvements have been designed by Mr. Leslie Irvin, who—it is hardly necessary to mention—is the demonstrator in two of the accompanying illustrations.



Light magnesium alloys

DR. G. D. BENGOUGH and MR. WHITBY, of the Chemical Research Laboratory of the Department of Scientific and Industrial Research, lectured before the Institution of Chemical Engineers on December 8 on the corrosion and protection of magnesium and its light alloys. Engineers are greatly attracted by the use of magnesium, as it would reduce the deadweight by about one-third. Unfortunately, magnesium is very liable to corrosion, especially when exposed to sea-water or moisture. An impetus to its most extended use should, therefore, follow from the discovery of satisfactory methods for protecting it against corrosion. Some very promising methods for this purpose have resulted from work carried out at the Chemical Research Laboratory of the Department of Scientific and Industrial Research and were described last Friday by Dr. Bengough and Mr. Whitby to the Institution of Chemical Engineers. The process has the merit of simplicity, as it consists only in immersing the magnesium materials in a solution of selenious acid or its salts for about 15 minutes.

This results in the article becoming covered with a protective coating of selenium. The value of the treatment, Dr. Bengough pointed out, is likely to be greatly increased by the fact that the coating appears to afford a very satisfactory basis for applying paints which may sometimes be necessary in cases of prolonged or severe exposure. The lecture was illustrated by figures showing the great superiority of this British process over competing foreign processes. There is at present little or no production of magnesium metal in the Empire, but there was formerly a certain production in this country. There are, however, known deposits of magnesium compounds in the Empire. These are potential sources from which the metal might be obtained. The protecting process now suggested affords an example of the way in which scientists find new uses for materials, which previously have found no extensive application. Selenium occurs in the sludges formed during the electrolytic refining of copper, but only a small fraction of this output has hitherto been used commercially. It is in fact regarded as a waste product.

THE ROYAL AIR FORCE

London Gazette, December 5, 1933.

General Duties Branch

Sub-Lieut. P. M. Gregory, R.N., Flying Officer, R.A.F., ceases to be attached to R.A.F., with effect from November 16, on return to Naval duty, and is re-attached to R.A.F. as Flying Officer with effect from November 27 and with seny. of September 17. The follg. Pilot Officers on probation are confirmed in rank:—F. W. Richards (November 20); P. D. Carden (November 26).

The follg. are promoted with effect from December 1:—

Flight Lts. to be Squadron Ldrs.—G. D. Daly, D.F.C., L. G. Harvey, C. N. Ellen, D.F.C., A. P. Davidson, H. W. Heslop, O.B.E., J. L. M. de C. Hughes-Chamberlain.

Flying Officers to be Flight Lts.—H. R. Lowry, H. G. Wisher, P. J. H. Halahan, B. D. Nicholas, O. I. Gilson, G. F. Macpherson, A. W. Hunt, C. E. St. J. Beamish, S. R. Groom, N. H. Fresson, W. R. Monro Higgs, N. C. Odbert.

Flt. Lt. J. J. Lloyd-Williams, M.C., is seconded for duty with Met. Police Force (December 1); P/O. A. N. Bray is placed on retired list on account of ill-health (December 6).

Stores Branch

The follg. are promoted with effect from December 1:—

Flight Lts. to be Squadron Ldrs.—T. G. Bowler, P. F. Connaughton. Sqdn. Ldr. A. W. Turner, D.C.M., is placed on retired list (December 1).

Accountant Branch

F/O. H. C. Bakes resigns his permanent commn. (November 21).

Medical Branch

Flt. Lt. E. Donovan, M.B., Ch.B., is transferred to Reserve, class D (ii) (November 25).

Memorandum

The permission granted to Lt. W. E. Westwood to retain his rank is withdrawn on his conviction by the civil power (June 27).

ROYAL AIR FORCE RESERVE RESERVE OF AIR FORCE OFFICERS

General Duties Branch

F/O. J. C. Ticehurst is transferred from class AA (ii) to class C (November 2); F/O. H. F. Suren is transferred from class C to class A (November 30); Flt. Lt. P. S. Mumford (Capt., R.A.R.O.) relinquishes his commn. on account of ill-health (November 29). *Gazette*, November 21, concerning F/O. A. R. M. Brain (deceased October 21) is cancelled.

Stores Branch

F/O. R. H. Clay (Lt., R. War. R., T.A.) is transferred from class B to class C (November 27).

SPECIAL RESERVE

General Duties Branch

B. Money is granted a commn. as Pilot Officer on probation (December 6).

AUXILIARY AIR FORCE

General Duties Branch

No. 608 (NORTH RIDING) (BOMBER) SQUADRON.—P/O. C. W. Wright is promoted to rank of Flying Officer (September 1).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Wing Commanders: L. L. MacLean, to H.Q., Air Defence of Gt. Britain, Uxbridge, 6.11.33, for Air Staff duties, vice Wing-Com. C. O. F. Modin, D.S.C. C. O. F. Modin, D.S.C., to No. 58 (B.) Sqdn., Worthy Down, 6.11.33, to Command, vice Wing-Com. L. L. MacLean. W. H. Dolphin, to R.A.F. Base, Gosport, 26.11.33, for Engineer duties, vice Wing-Com. G. B. A. Baker, M.C. L. T. N. Gould, M.C., to Sch. of Naval Co-operation, Lee-on-the-Solent, 4.12.33, to Command, vice Group-Capt. J. C. Quinell, D.F.C. D. F. Stevenson, D.S.O., M.C., to H.Q., Palestine and Transjordan, 1.12.33, for duty as Senior Air Staff Officer, vice Wing-Com. J. C. Russell, D.S.O.

Squadron Leaders: L. M. Iles, A.F.C., to Home Aircraft Depot, Henlow, 27.11.33, for Engineer duties, vice Sqdn.-Ldr. R. V. Goddard. W. S. Caster, to H.Q., Coastal Area, Lee-on-the-Solent, 30.11.33, for Equipment (Engineer) Staff duties, vice Sqdn.-Ldr. H. J. Roach, A.F.C. J. H. Green, to No. 2 (A.C.) Sqdn., Manston, 1.12.33, to Command, vice Sqdn.-Ldr. P. F. Fullard, D.S.O., M.C. C. B. S. Spackman, D.F.C., to H.Q., Inland Area, Stanmore, 1.12.33, for Personnel Staff duties, vice Sqdn.-Ldr. C. E. H. James, M.C.

Flight Lieutenants: H. Broadhurst, to No. 19 (F.) Sqdn., Duxford, 26.11.33. C. S. Ellison, to No. 2 Armoured Car Co., Ramleh, 24.11.33. E. E. Fallick, to No. 47 (B.) Sqdn., Khartoum, 24.11.33. A. H. Owen, to No. 2 Armoured Car Co., Ramleh, 24.11.33. J. H. Woodin, to Air Ministry, Dept. of Chief of the Air Staff (D.O.I.), 4.12.33. F. K. Damant, D.F.C., to R.A.F. Depot, Middle East, Aboukir, 17.11.33. A. E. Lindon, M.B.E., to R.A.F. Depot, Uxbridge, 29.11.33.

Flying Officers: E. C. Hudleston, to No. 1 (Indian Wing) Station, Kohat, 24.11.33. K. Lea-Cox, to No. 12 (B.) Sqdn., Andover, 27.11.33. P. H. Maxwell, to No. 15 (B.) Sqdn., Martlesham Heath, 27.11.33. W. E. Rankin, to No. 58 (B.) Sqdn., Worthy Down, 22.11.33. G. W. P. Grant, to No. 54 (F.) Sqdn., Hornchurch, 27.11.33.



Acting Pilot Officers: The following Acting Pilot Officers are Posted to No. 4 Flying Training School, Abu Sueir, on 24.11.33:—S. G. Birch, C. C. Byar, A. B. Dreghorn, C. L. Gomm, C. C. Hodder, P. S. Hutchinson, W. O. Jones, J. C. M. Lonsdale, V. H. P. Lynham, R. G. Musson, R. G. Seys, R. G. Slade, J. M. Southwell and W. N. Stubbs.

Stores Branch

Flying Officers: R. B. Fleming, to No. 605 (Co. of Warwick) (B.) Sqdn., Castle Bromwich, 4.12.33. G. J. Gaynor, to Station H.C., Tangmere, 3.12.33.

Accountant Branch

Squadron Leader C. H. Moore, to R.A.F. Depot, Middle East, Aboukir, 24.11.33, for Accountant duties.

Flight Lieutenant H. J. Titherington, to Aeroplane and Armament Experimental Estab., Martlesham Heath, 5.12.33.

Medical Branch

Flying Officer G. Gilchrist, to R.A.F. Base, Malta, 24.11.33.

NAVAL APPOINTMENTS

The following appointments have been made by the Admiralty:—

Sub-Lieutenants: W. L. Mayo, P. A. R. Bremridge, N. R. Williams, M. C. Hoskin, and M. J. A. O'Sullivan, attached to R.A.F. (January 14).

PROMOTION

Sub-Lieutenant G. W. R. Nicholl (F/O., R.A.F.), to rank of Lt. (seny. December 1).



Last Thursday this commendable body held a most enjoyable Fancy Dress Ball at the Greyhound Theatre, Croydon. Members of the staffs of Imperial Airways, K.L.M., D.L.M.—in fact all of the companies using Croydon were there. Many must realise now that Paris and Berlin are not the only gay cities, but that we in London also have some fun: although one of the costumes we noticed suggested Le Bourget rather than Croydon. Messrs. Allen (Air Taxis), Pace (Imperial Airways) and Thompson (Air Ministry) acted as very able M.C.'s, while Major and Mrs. Richard, and Capt. and Mrs. Leverton, the judges, seemed to derive great pleasure from helping everyone else to enjoy themselves. The Committee's second Annual Dinner, Cabaret and Dance will be on January 30, 1934.

The "Societe Industrielle a'Aviation"

A NEW co-operative society, with the above name, has been formed in Belgium, with offices at 183, Avenue Milcamps, Brussels. The "S.I.A." intends to develop "touring" aircraft, which will be put at the disposal of members, the price of a flying hour not exceeding, in any case, 200 Belgian francs (£1 16s. 4d.).

Maj. Seversky's new post

MAJ. ALEXANDER DE SEVERSKY, the builder of the Seversky amphibian which holds the world's speed record for amphibians, has joined the De Soto Motor Car Co. (U.S.A.) as consulting engineer. The De Soto, which belongs to the Chrysler group, has made a statement that it will not build any aeroplanes during the year 1934.

R.A.F. Club and Christmas

THE Royal Air Force Club will be closed from 2.30 p.m. on Wednesday, December 27, until 12.30 p.m. on Thursday, December 28 (for the purpose of holding the Annual Staff Dance), except in so far as affects bedroom accommodation (with breakfasts only) to residents and members who have engaged bedrooms prior to noon on December 27. The Club will remain open during the Christmas holidays.

R.A.F. Display Proceeds

As a result of the profits obtained at the R.A.F. Display this year, £8,761 has been paid to charitable institutions.

R.A.F. Gift to Lifeboat Service

As a result of collections made in various R.A.F. messes in Iraq, the sum of £20 has been presented to the Royal National Lifeboat Institution.

D.H. Profits

THE accounts of the de Havilland Aircraft Co. show a considerable increase of profits over last year. They have increased from £2,223 to £63,439. A dividend of 7½ per cent. is being paid, which is treble the rate of the previous year.

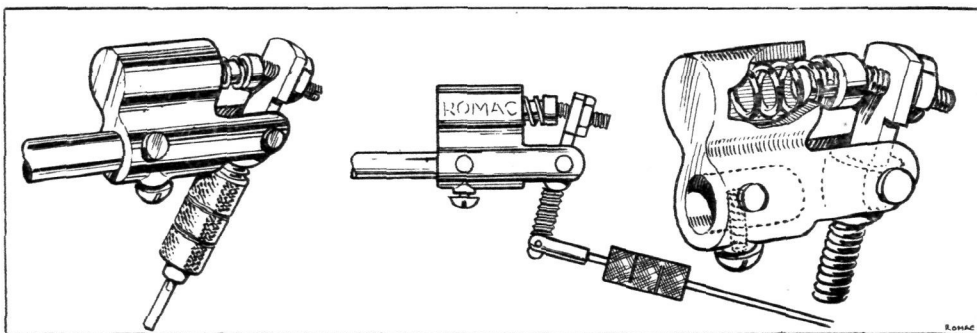
Croydon's night out

THE Airport buildings at Croydon house many jolly folk. They are brought together socially every now and again through the Croydon Airport Social Committee.

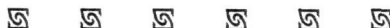
FOR A CLEAR WINDSCREEN

ONE of the most vexed problems to-day is the provision of an adequate means of clearing the windscreen when flying through bad weather, such as fog, fine drizzle or snow. In the air the problem is aggravated because there is usually a high-speed slipstream over the windscreen which tends to blow any form of wiper away from the glass. For this reason we are now trying out a new form of windscreen wiper arm which would seem to solve this problem. We have already tried it in a motor-car, and for the first time in our lives have been satisfied when driving at night in fine rain. We are also making arrangements to try it in a number of different machines in the air, and shall therefore have more to say about that side of it later. As will be seen from our drawings, the arm is one which can be screwed

The new Romac adjustable tension windscreen wiper arm can be kept pressed hard on the glass. It can also be turned up easily to allow cleaning the windscreen



to the shaft of the windscreen wiper itself in place of any existing arm. The spring, which acts on the end of the arm itself beyond the pivot, can be screwed down with an adjusting screw to give whatever tension is required, thus the wiper itself may be held against the glass extremely tightly. This arm is marketed by Romac Motor Accessories, The Hyde, Hendon.



Death of Mr. Hazell

It is with the greatest regret that we have to announce the death, after a short illness, of Mr. Archibald George Hazell, secretary and a director of the Fairey Aviation Co., Ltd., at the age of 48. Mr. Hazell was one of the very first employees of the Fairey Company, having been with them for nearly 18 years. Originally an accountant, Mr. Hazell became the company secretary in 1923, and was made a director in 1928. Later he was appointed director of the Air Survey Co., Ltd., and of Avions Fairey, S.A., of Gosselies, Belgium. A hard worker and of vigorous personality, Mr. Hazell enjoyed universal popularity. He was an enthusiastic golfer, and was at one time captain of the Ealing Golf Club and a strong supporter of the Aero Golfing Society and the London Golf Captains' Association. The death of Mr. Hazell is a severe loss to the Fairey Aviation Co., Ltd., which he helped to build up from very small beginnings, and to the British aircraft industry in general.

A new aircraft service depot

ROLLASON AIRCRAFT SERVICES has been opened by Capt. W. A. Rollason at Croydon aerodrome, where his telephone number is Fairfield 6676. There he undertakes all kinds of repairs and overhauls to aircraft and engines, and is the Croydon service agent for the de Havilland products. His workshops are situated in the old A.D.C. sheds on the northern side of the aerodrome, where Mr. F. A. Kent will be in charge.

Mr. P. T. Griffith's new appointment

MR. P. T. GRIFFITH, A.F.R.Ae.S., has recently been elected a director of the Williamson Manufacturing Co., Ltd., of Willesden Green, N.W.10. Mr. Griffith has been continuously connected with civil aviation since 1919, and has been sales manager of the company for some years; during the summer of this year he carried out a most successful air tour of the Baltic States, demonstrating the latest "Eagle" camera. The demands for the Williamson products, which come from every continent, are increasing monthly, and this year have been so great that the whole of the company's output has already been sold out.

London international air post exhibition

An artistically produced advance prospectus of the Apex (Air Post Exhibition) to be held at the Royal Horticultural Hall, London, from May 7 to 12, 1934, has just been published. On the Committee of Honour will be found the names of some hundreds of prominent aero-philatelists of all nations, who are giving their support to the exhibition, as well as a distinguished list of eminent patrons and officers. Details of the scheme of competitions and regulations under which entries may be made are also contained in this attractive brochure, obtainable, post free, from the organising director, Fred. J. Melville, 10A, Ardbeg Road, London, S.E.24.

PUBLICATIONS RECEIVED

Survey of the Import Trade of India during the First Six Months of the Fiscal Year April 1st, 1933, to September 30th, 1933. No. C. 4227. Department of Overseas Trade, 35, Old Queen Street, S.W.1.

A Survey of the Air Currents in the Bay of Gibraltar, 1929-30. By J. H. Field and R. Warden. M.O. 356s. Meteorological Office, Air Ministry: Geophysical Memoirs, No. 59. London: H.M. Stationery Office, W.C.2. Price 5s. net.

Calendar, 1934. Zinc Alloy Rust-Proofing Co., Ltd., Shakespeare Street, Horseley Fields, Wolverhampton.

NEW COMPANY REGISTERED

AYRSHIRE AERO, LTD., The Picture House, 38, West Main Street, Darvel.—Registered in Edinburgh. Capital, £1,300 in £1 shares. Aerodrome proprietors, flying instructors, owners, hirers, manufacturers and repairers of all classes of aircraft, etc. Directors: Adam T. Smith, 22, Campbell Street, Darvel, air pilot. Samuel W. McInnes, "Elmtrees," Newmilns, lace manufacturer. Thomas Young, Jun., Turf Hotel, Darvel, mechanic. Adam M. Dick, 79, Holehouse Road, Kilmarnock, mechanic. Alexander Cochrane, Craigston, Newmilns, house furnisher. William Frame, Morven, Darvel, card cutter.

Companies Incorporated Outside Great Britain

(Somerset House Particulars under Section 344)

AIR-FRANCE.—Particulars of Air-France (Société Anonyme) have been filed at Somerset House pursuant to Section 344 of the Companies Act, 1929. The company has a place of business in London at 52, Haymarket, S.W.1, where John Norton Bamford (manager) is authorised to accept service of process and notices on behalf of the company. It was incorporated in France in August 1933, to organise and work in France, in the Colonies, in protectorate countries or countries under a mandate, and abroad, passenger, parcel and postal services by means of aerial machines and by other modes of transport by sea or land, to investigate and centralise all technical, industrial, commercial and financial information which may concern aerial locomotion, to hold a direct or indirect interest in undertakings accessory to the activities of the company, for the sole purpose of assuring the proper carrying on of the services granted to the company (but only with the authority of the Minister in charge of Civil Aeronautics), etc.

The company acquired all the assets of the Compagnie Air-Orient (capital 50,000,000 francs), the Compagnie Air-Union (capital 25,000,000 francs), the Compagnie Internationale de Navigation Aérienne (capital 8,250,000 francs), and the Société Generale de Transport Aérien (capital 10,000,000 francs).

The capital is 120,000,000 francs in 240,000 shares of 500 francs each.

The directors are: Ernest Roume (Hon. Governor-General, French Colonies, chairman), Louis Allegre (retired Naval officer, general manager), Georges E. Bonnet (Asst. Gen. Manager, Suez Canal), Louis C. Breguet (constructor of Breguet aeroplane), Dick Farman (English, residing in Paris, constructor of Farman aeroplanes), Henri C. E. Borromee, Rene J. E. Porquet (Chief of Dept., Air Ministry, France), and Francois H. Richard (Inspecteur des Finances).

The registered office is at 2, Rue Marbeuf, Paris, but may be transferred to any other place in the department of Seine. The file number is F3,172.

PATENT AERONAUTICAL SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motors (The numbers in brackets are those under which the Specification will be printed and abridged, etc.)

APPLIED FOR IN 1932

Published December 14, 1933

- 7,415. BENDIX AVIATION CORPORATION. Engine-starting apparatus. (401,699.)
- 10,394. J. J. E. SLOAN. I.c. engines of the Diesel, compression-ignition, or injection type. (401,675.)
- 10,729. F. A. PERKINS. I.c. engines of the fuel-injection type. (401,703.)

APPLIED FOR IN 1933

Published December 14, 1933

- 13,985. BENDIX AVIATION CORPORATION. Navigating-instruments. (401,714.)

Personals.

PREPAID (18 words or less 3/6, then 2d. per word.)

To be Married.

DAVISON : MUNTZ.—The engagement is announced between Mr. F. DAVISON, son of Capt. R. G. Davison, formerly of North Lodge, Darlington, and Miss **ELSIE JOY MUNTZ**, of Chester, daughter of the late Mr. R. G. Muntz, of Toronto, Canada.

Married.

GRINDLELL : OAKES.—On December 9, 1933, at Chelsea Old Church, Mr. GORDON JOHN GRINDLELL, R.A.F., younger son of Mr. and Mrs. John Grindlell, of Simon's Pass, Fairley, near Timaru, New Zealand, and Miss WINIFRED DOROTHY OAKES, daughter of Capt. M. P. R. Oakes, late 5th Royal Irish Lancers, and of Mrs. Oakes, 10, Wilbraham Place, Sloane Street.

ROBERTS : MOORE.—On December 9, 1933, at Holy Trinity, Cookham, Berks, **FLIGHT-LIEUT. DAVID NEAL ROBERTS**, youngest son of the late Mr. Edward Roberts, late of The Grange, Bolney, Sussex, and Mrs. Roberts, The Boyne, Maidenhead, Berks, and Miss **RUTH ALMA MOORE**, second daughter of Lt.-Col. and Mrs. Harold A. Moore, Beechwood, Cookham Dean, Berks.

BURLEIGH : EAGER.—On December 6, 1933, at St. Andrew's Church, Hertford, **THOMAS HAYDON BURLEIGH**, R.A.F., only son of Mr. and Mrs. Hugh Burleigh, of Great Chesterford, Essex, to **KATHLEEN MARY LENTHALL EAGER**, only daughter of Dr. and Mrs. Gurth Eager, of Bayley Lodge, Hertford.

Deaths.

HARVEY.—On December 4, 1933, at 35, Chelsea Park Gardens, S.W., **LAETITIA**, beloved infant daughter of Arthur Vere and Frances Laetitia Harvey.

LLEWELLYN.—On December 4, 1933, killed while flying, **GRIFFITH OWEN LLEWELLYN**, Pilot Officer, 17th Squadron, R.A.F., son of Mr. and Mrs. Griffith R. P. Llewellyn, of Baglan, Briton Ferry, Glam., and The Garden House, Stanford Dingley, Berks, aged 21.

MOFFATT.—On December 2, 1933, **ALEXANDER MCKITCHIE MOFFATT**, R.A.F. (retired), son of the late Sheriff Moffatt, of Falkirk, aged 41 years.

MISCELLANEOUS ADVERTISEMENTS.

Advertisements for this column should arrive at this office by **Monday, 12 o'clock noon.**

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A. P. THURSTON & CO., Chartered Patent Agents, 329, High Holborn, W.C.1. Tel.: Hol. 1117.

F. J. CLEVELAND & CO., Chartered Patent Agents, 29, Southampton Buildings, London, W.C.2. Telephone: Holborn 5875-6.

KINGS PATENT AGENCY, LTD., 146A, Queen Victoria Street, E.C.4.—“Advice Handbook” and consultations free. 47 years' references. Phone: Central 0682.

GEE & CO. (H.T.P.) Gee Patent Agent for Great Britain, U.S.A., Canada, etc., Mem. Rad. S.G.B., A.M.I. Rad. E.), 51-52, Chancery Lane, London, W.C.2 (two doors from Govt. Patent Office). Phone: Holborn 1525. Handbook Free.

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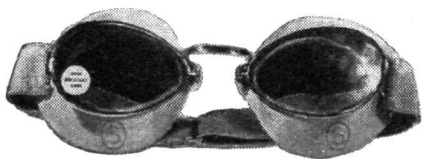
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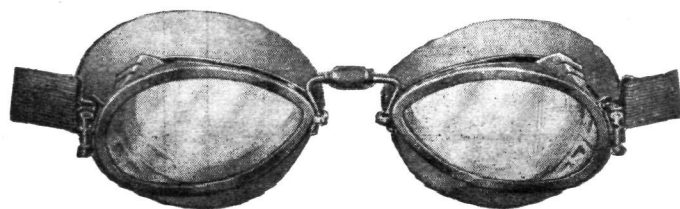
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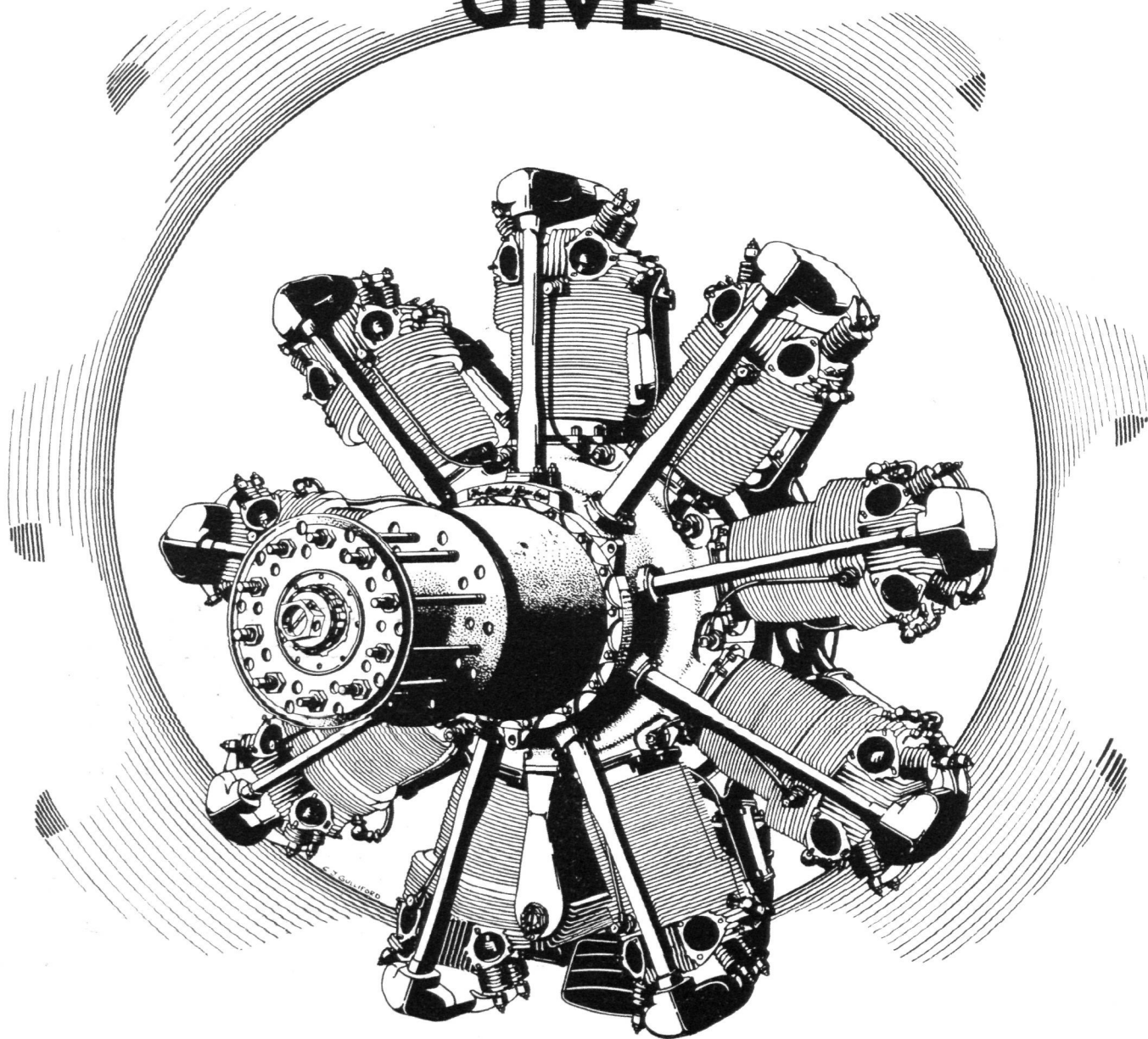
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